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Plastics

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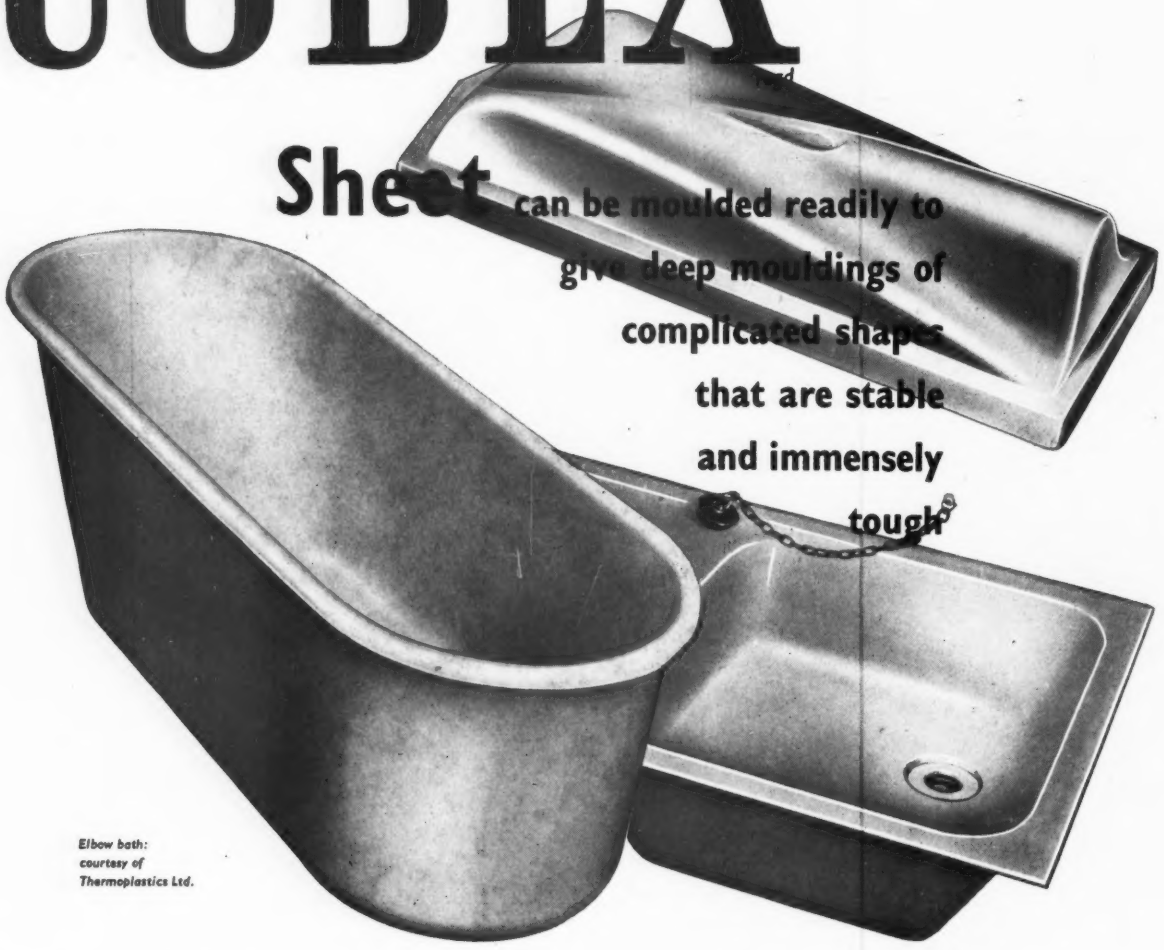
Sheet can be moulded readily to give deep mouldings of complicated shapes that are stable and immensely tough



Elbow bath: courtesy of Thermoplastics Ltd.

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Ⓐ

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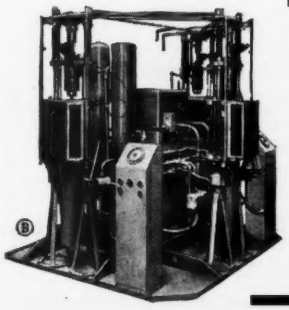

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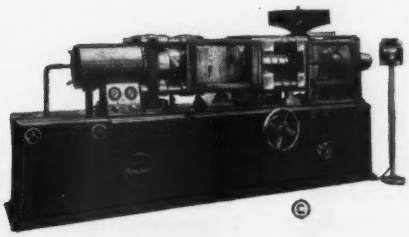

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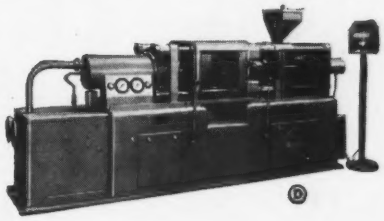

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The new thermo-plastic material. Probably the toughest and strongest known. Tensile strength equal to aluminium and more than double on weight-for-weight basis. Impact strength 14-16 (IZOD). High softening point. Weight 1/7 that of chrome steel. Can be moulded, machined, threaded and formed to give great strength plus high dielectric properties. Available as sheeting, compression or injection mouldings, extruded rod and tube or as a moulding powder. FromoPLAS H.T. is already extensively in use in leading aircraft and for other super-priority purposes. Supplies are reserved at present for D.O. priorities and export, but sample quantities are available for test for general development.

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HYDRAULICALLY OPERATED THROUGHOUT

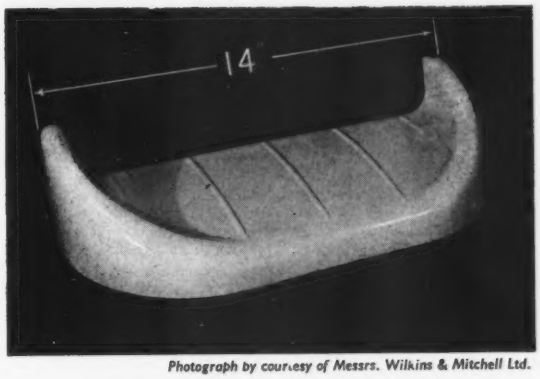
FULLY AUTOMATIC — SINGLE CYCLE OR MANUAL OPERATION

A hydraulically-operated machine for rapid production of high quality mouldings. Arranged for fully automatic, single cycle or manual operation. Driven by 20 h.p. motor. Locking pressure 250 tons developed on die-plates 21″ x 25″.

A moulding with a maximum projected area of 100 sq. in. can be made.

We specialize in all types of machinery for plastics and also the design of dies and moulds.

Full particulars from Plastics Dept., Red Lane Works.



Photograph by courtesy of Messrs. Wilkins & Mitchell Ltd.

Polystyrene Washing Machine Tray—weight 9½ oz.—area 63 sq. in.—moulded for Messrs. Wilkins & Mitchell Ltd., The Green, Darlaston, Staffs. by the G.E.C. Witton, on a Herbert-Reed-Prentice 10D 10 oz. Machine.

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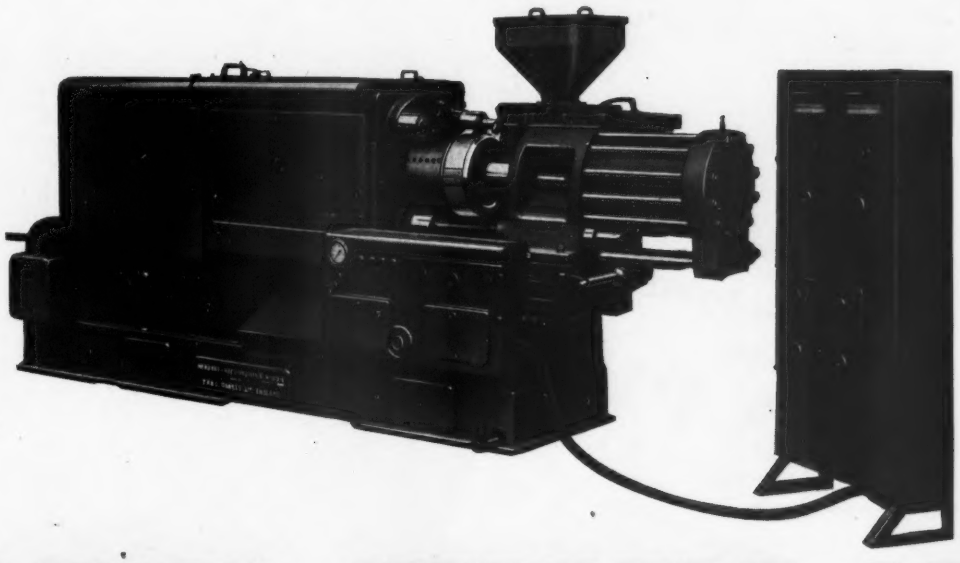

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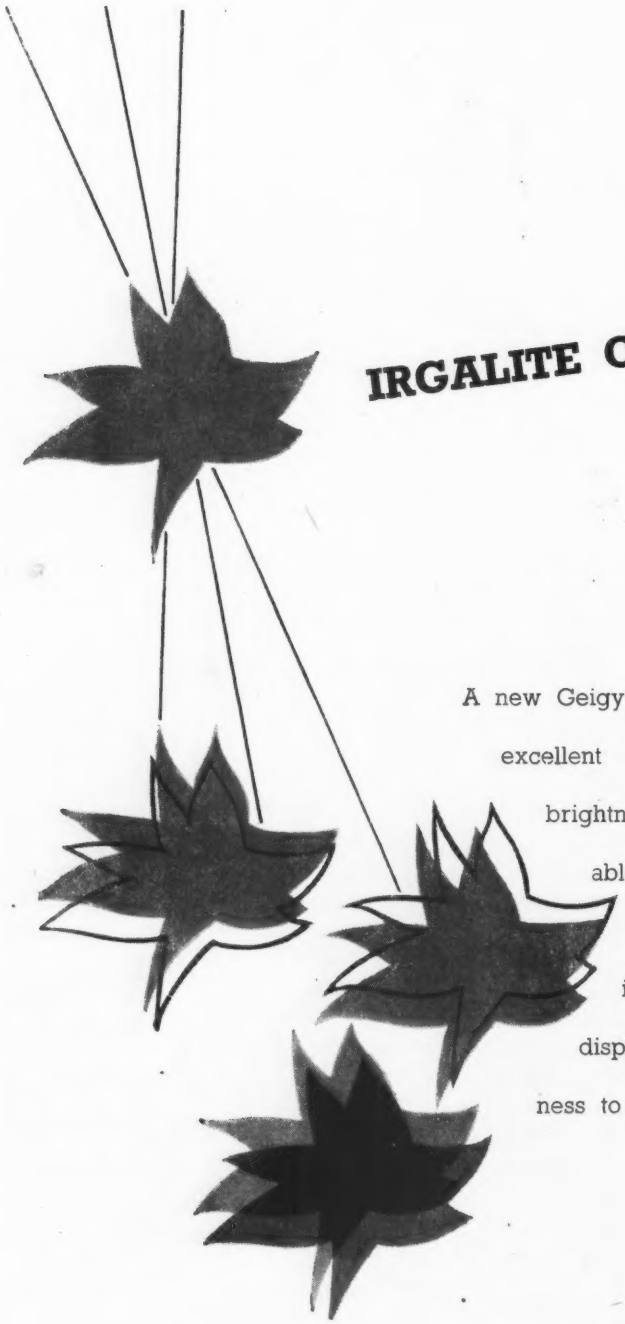

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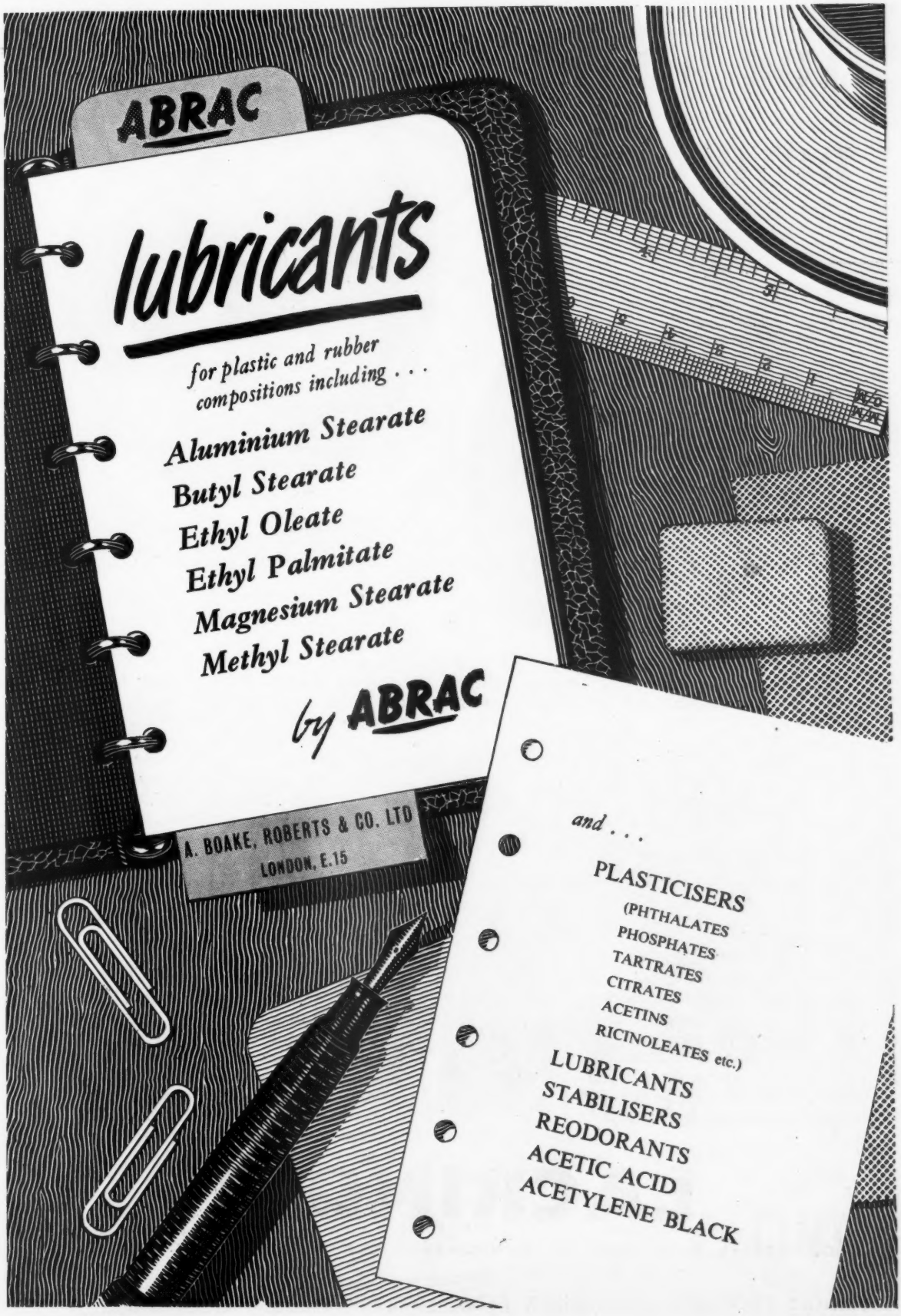
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You would never guess

You'd never guess from examining this sphere what its purpose is. In any case, it is of no value to anyone in this country unless our gambling laws are changed. Here is the story. A firm in Malta wrote to us saying that they had seen some of our door furniture advertising. They said that if we could make door knobs, we ought to be able to make hollow spheres for use in the Malta Government lottery. We asked for details and were told that each sphere had to be $1\frac{1}{64}$ inches in diameter, that its two halves should be secured together by exactly two and a half turns, that the colour should be black and that all the spheres should be exactly alike. Moreover the spheres should withstand the frantic knocking about they would receive in the cages used in the drawing of the lucky numbers. As the order would run to thousands, and the initial expense for tools and moulds would therefore be justified, we accepted the order and did the job.

We designed and made the necessary tools and moulds in our own shops and manufactured the quantities of spheres required, dispatching them in good time for the lottery. Everyone was satisfied, particularly the prize winners, no doubt.

This order is typical of many we carry out to suit special requirements. Sometimes we have to refuse an order because we realise that plastics is not the answer to *every* manufacturing problem. On the other hand, we have frequently been able to make products and components in plastics better and cheaper than they can be made in any other material. We are always ready to discuss and examine thoroughly a project which may involve the use of any form of plastics. If the job goes forward we will design and make the jigs, tools and moulds. The most up-to-date moulding machines will be used. And throughout, we will supply that great essential—the "know-how".

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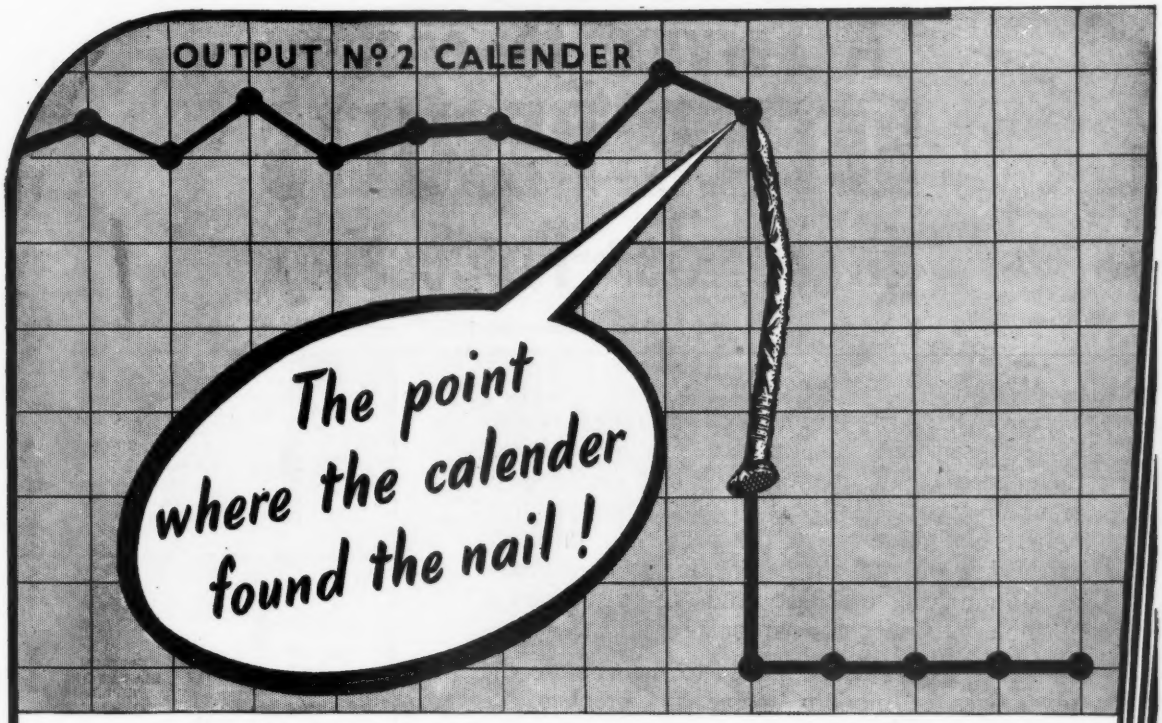

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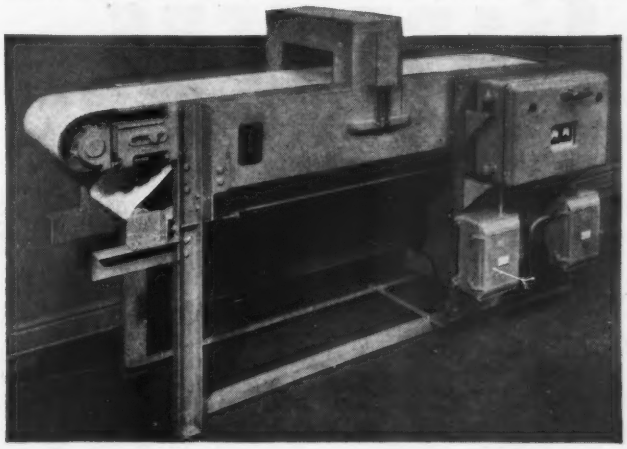
The New 'CINTEL' Industrial Electronic METAL DETECTOR

In many plastic industries throughout the country this 'CINTEL' equipment is protecting expensive calender machinery from damage due to the presence of tramp metal in the plastic mix. No matter whether the metal be ferrous or non-ferrous, the detector will find it and prevent it reaching the calender.

What it is successfully doing for others, it can do for you. Why not write in for details today ?



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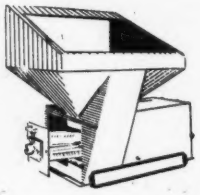
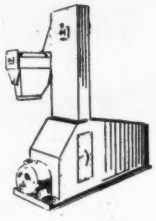
THE GARDNER laboratory is equipped to give a special service to manufacturers in the testing of their product to ascertain the best method of securing accurate batches to particular specifications. No matter what the problem, Gardners' experience of over three generations is available to obtain the quickest and most economic machinery to suit your particular product.

Standard machines, redesigned to incorporate the advantages of modern engineering practice, are available for all powder processing, and special machines can be designed when necessary.

Please send your materials for a test or write for details of latest standard machines.



SIFTERS



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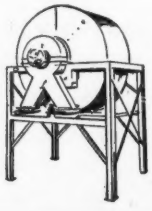
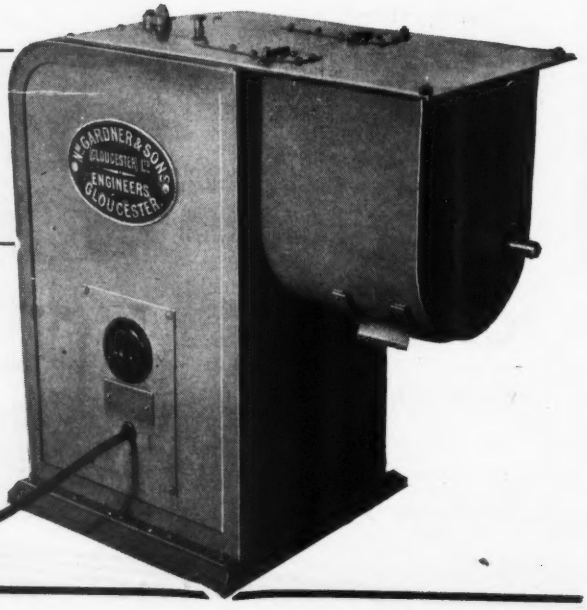


DRUM MIXERS

GARDNERS of Gloucester

This new Laboratory-type Mixer, which is supplied with self-contained motor and gear for coupling to the mixer shaft, handles approximately 14 lbs. of material at a charge (at 40/45 lbs. per cu. ft.). Agitator lifts out in one piece, without disturbing guards or gear drives. Easily transportable, with built-in starter—simply plug in. Designed for use on bench, with space for container beneath outlet to receive mix. Motor operates on single phase supply.



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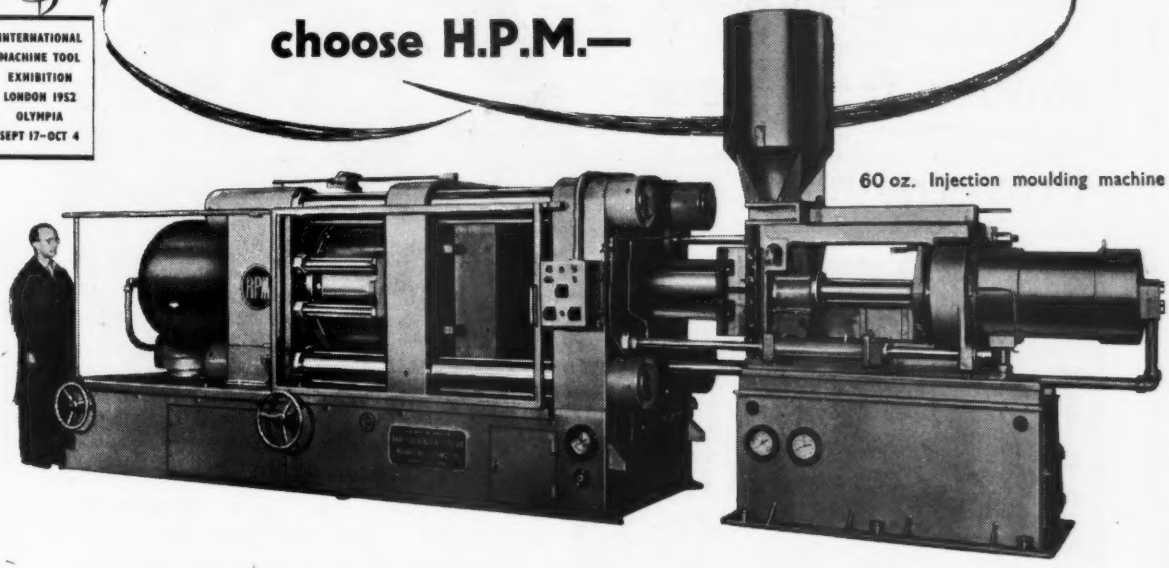
The leading "big" moulders choose H.P.M.—



60 oz. Injection moulding machine

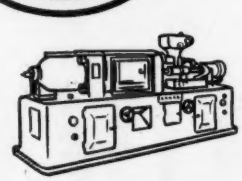
— and here's why

Injection moulders like the 60 oz. H.P.M. for big jobs . . . the power system is out in the open for easy accessibility . . . There's plenty of clamp pressure (1,000 tons) . . . big mould space (40" x 60") . . . lots of daylight (60") . . . and enough stroke for those deep draw jobs (36").

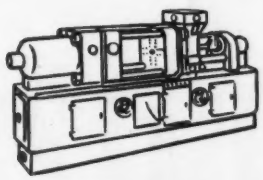
These big H.P.M.s are setting new records in rapid production of big refrigerator parts, radio and television cabinets, automobile mouldings, etc.—that's why so many have been installed.

Regardless of your moulding job, whether it requires a 9 or 60 oz. machine, investigate the many outstanding features of H.P.M.s all-hydraulic design; write for full details now.

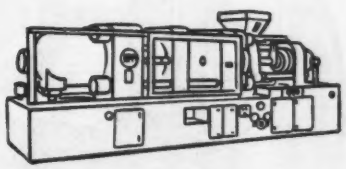
BRITISH HPM BUILT



9 OUNCE



16 OUNCE



32 OUNCE

Manufactured under licence by JOHN SHAW & SONS (Salford) Ltd., Salford 3, Lancs.

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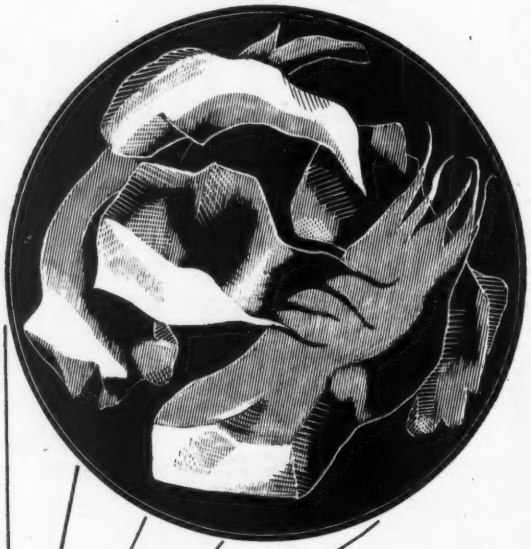

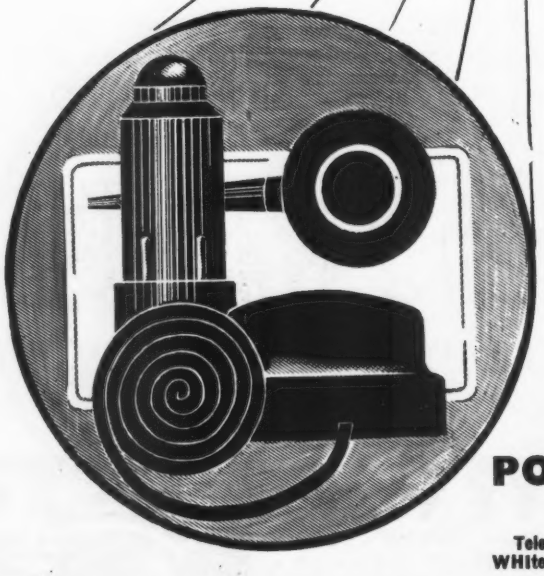

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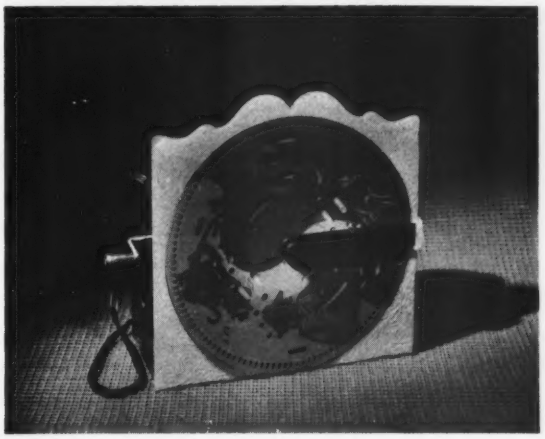
Telephone: WHitehall 3978. **Grams: Lebathene, Piccy.** **Cables: Lebathene, London.**

"It's very easy"

says Mr. Bessant of Universal Tools.

. . . to play the "SELCOL HURDY GURDY" and it needs no skill or experience and very little effort to produce a tune.

You can't make moulds however, by just turning a handle, it demands a vast amount of skill and experience plus some quite elaborate plant. Even then, if you want to make really good tools, you've got to add a real interest in a customer's project and I'm sure it is just this combination which has enabled us to tool successfully so many of the "tricky" mouldings you see around.



Fifteen different plastic mouldings are used in this attractive and tuneful toy, moulded by Thames Valley Moulders, Ltd., for Selcol Products, Ltd., on Peco 8-oz. injection machines.

It has a realistic tone and a repertoire of tunes is provided by means of the rapidly changed paper disc records.

UNIVERSAL TOOLS LTD.

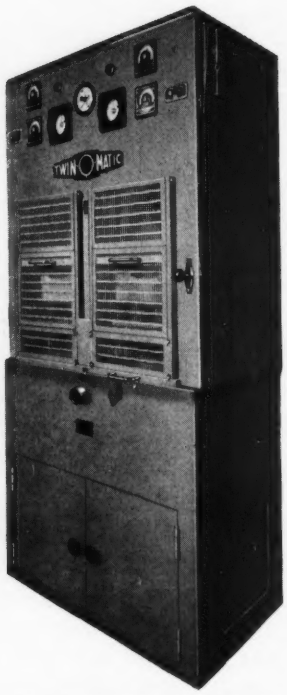
TRAMWAY PATH, MITCHAM, SURREY.

Telephone: MITCHAM 1624

TWIN-O-MATIC

Range of Moulding Presses will double your output with existing labour and space

Supplied ready for immediate action



50 Ton TWIN *Moulding* PRESS

Entirely self contained, the TWIN-O-MATIC effects a considerable saving in operational costs. Its ample platen area makes it suitable for the production of a wide range of compression mouldings from single or multi-impression moulds. The normal time taken for loading, unloading and cleaning of moulds is completely eliminated from the moulding cycle, as the rams alternate automatically up and down. A two-stage pump ensures extremely rapid closing of moulds.

SPECIFICATION

PUMP, TWO-STAGE, 13·2 gallons at 200 P.S.I., 1·25 gallons at 2240 P.S.I.

WORKING PRESSURE 2240 P.S.I.

RATING 50 tons per ram. **RAM STROKE** 8".

DAYLIGHT BETWEEN HOT PLATES 16" max.

SIZE OF ELECTRIC HOT PLATES 13" × 15½"

GUARDS Fully interlocked.

ELECTRIC SUPPLY 3 phase 50 cycle A.C. 440V. 4 wire (Alternative Supply to Order)

ELECTRIC MOTOR 2½ h.p. continuous rating.

INSTRUMENTS Two Automatic Timing Clocks. Pressure Gauge. Four Combined Temperature Indicators and Controllers. Two Pilot Lamps. Two Remote Control Stations. Thermostat Pilot Lights.

OIL CAPACITY 35 gallons.

FITTED with Fully Interlocked Isolator and Distribution Board.

OVERALL DIMENSIONS 3' 7" × 2' × 7' 3¾".

Please Write for details of the

TRIPLE TWIN-O-MATIC 25-TON PRESS

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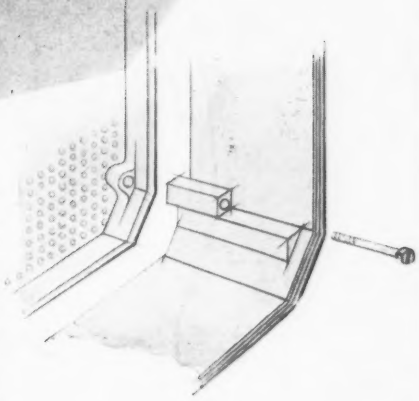
BURY NEW ROAD · WHITEFIELD · LANCASHIRE
Telephone: WHitefield 2075

Designer's Diary N.º5

In this series the B.I.P. Product Design Unit seeks to illustrate how technical requirements can be met to produce pleasing, readily mouldable articles in plastics. Reprints of these announcements will be gladly supplied on request.

The Product. Radio cabinets as a whole have tended to become rather stereotyped, as regards materials as well as form. There are, on the one hand, the beautifully veneered types, expensive to produce; and, on the other, self-coloured all-plastics moulded cabinets which generally follow rounded contours. These latter are also comparatively expensive because they involve a deep moulding and, consequently, somewhat high tooling costs. This design is an attempt to indicate how production costs could be lowered by using wood and plastics in combination, at the same time providing a pleasing and refreshing contrast in textures.



Diagrammatic details of method of fixing

The Design. This cabinet is economical to produce because the wooden part is, in effect, simply a box without a base; one of the simplest of veneered forms, with a shallow, and therefore comparatively inexpensive, plastics front.

Amongst the main points of interest are the textured panel, which is incorporated as a loose piece in the mould and could, therefore, be interchanged if desired; and the knobs, of sculptured form to provide a positive fingerhold.

Assembly is extremely simple, the front being fixed to the body of the cabinet by four bolts through glued wooden blocks. Note that in the front elevation there is a small step between the body and front. This not only adds interest, but overcomes the difficulty always encountered in attempting to make a perfect butt-joint between wood and plastics.

The Material. Either Beetle or Scarab urea moulding powders are recommended for their fine texture, wide colour range and excellent electrical insulation properties.

The B.I.P. Technical Advisory Service is always ready to help moulders in any problem which may arise regarding product design, mould design, materials and moulding techniques. This consultative service is freely offered, without obligation, and applies to moulding in thermoplastic as well as thermosetting materials.

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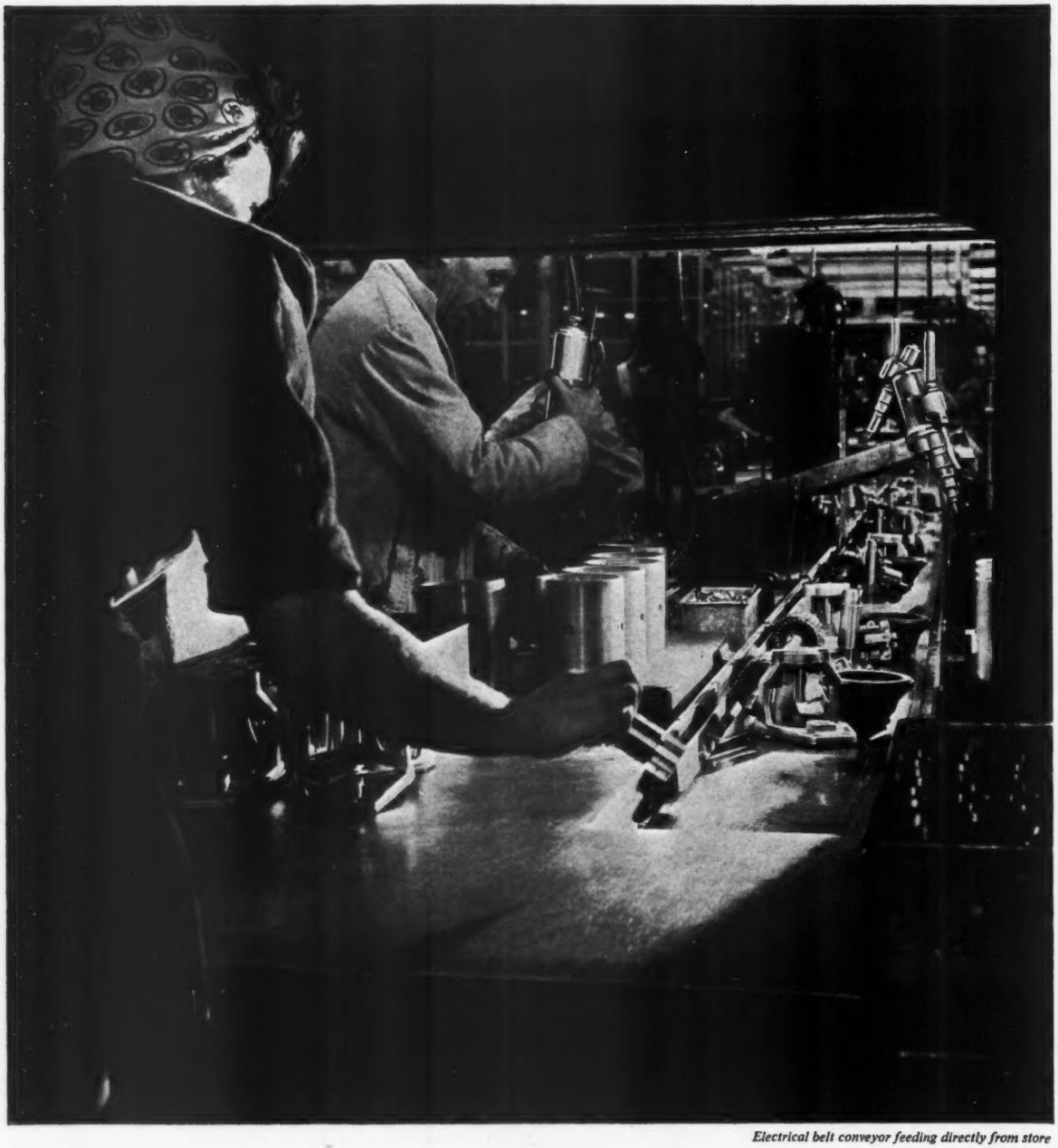

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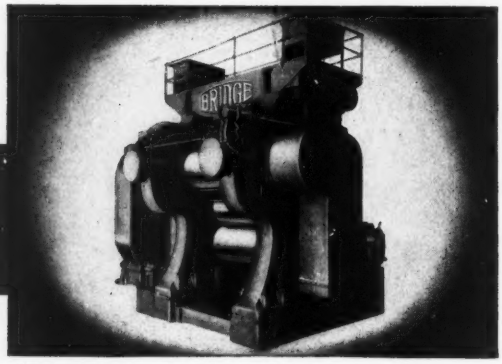

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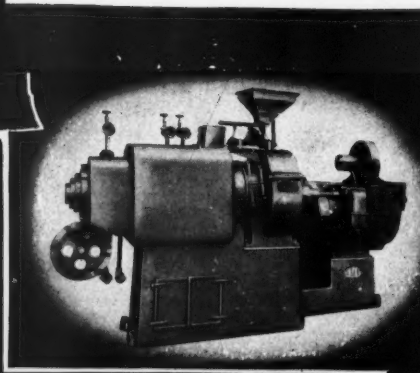

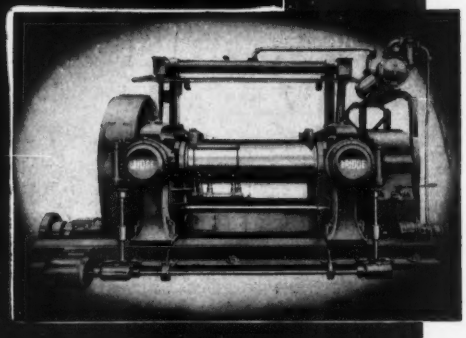

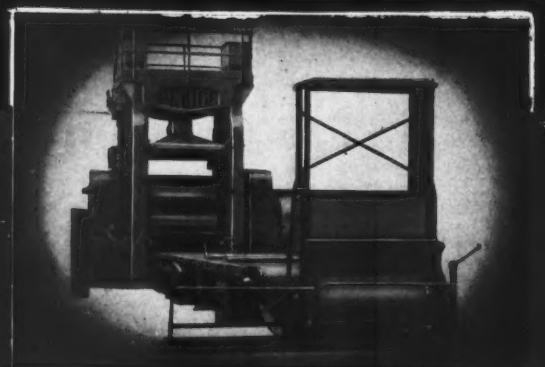

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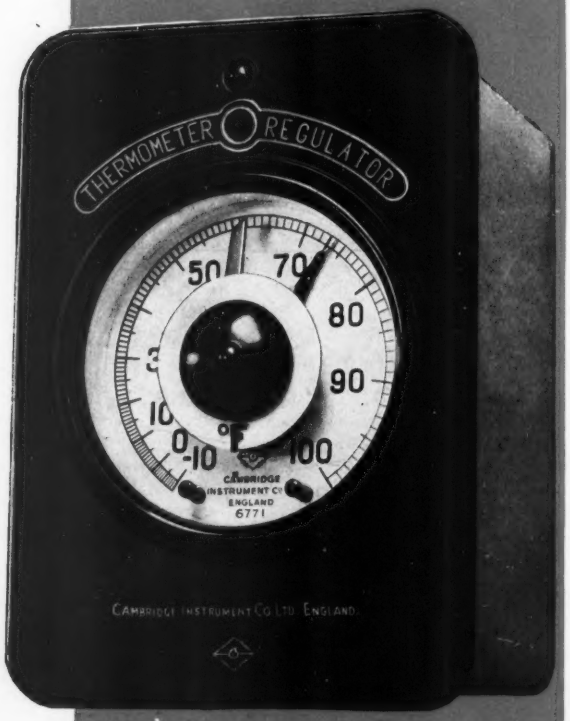

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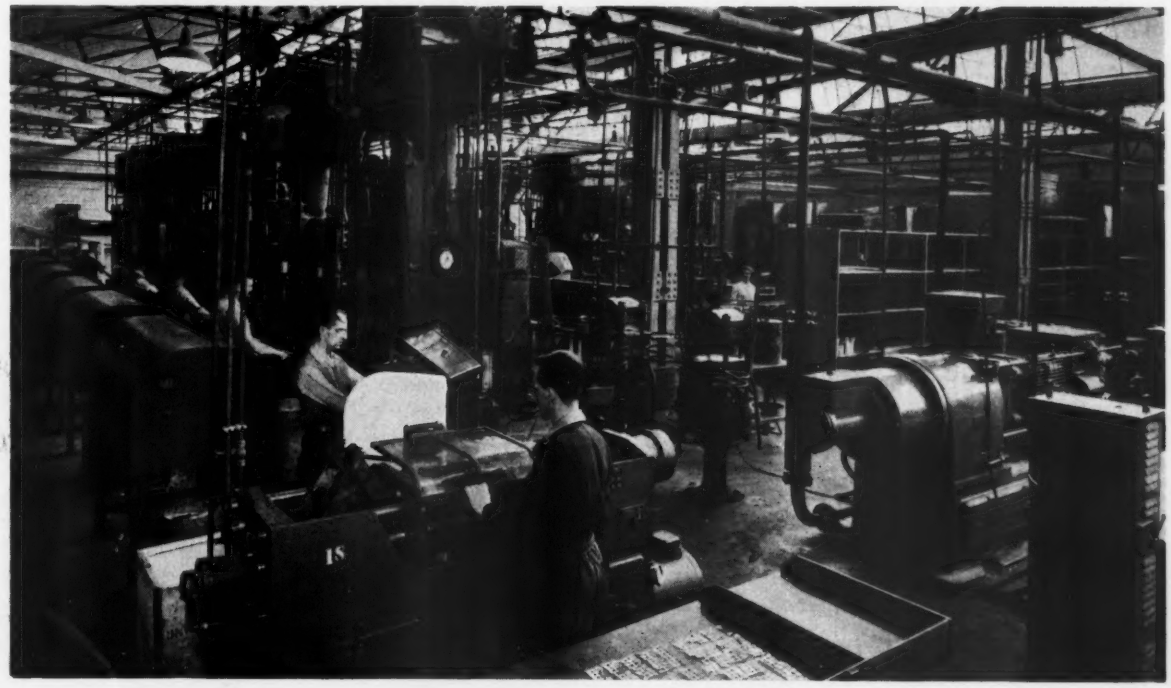
Moulding shop of Roanoid Plastics Ltd., at their works at Hillington, Glasgow.



BM168

The large illustration shows the plastic moulding and the small illustration the complete recorder with its card receiver and time-indicating numerals —both shown through the courtesy of IBM UNITED KINGDOM LTD. (formerly International Time Recording Co. Ltd.)

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Plastics

VOL. XVII. No. 179 JUNE, 1952

EDITORIALS

The British Industries Fair

THE 1952 B.I.F. has been one of the most perplexing we have yet attended. Purely from the technical point of view, it has been one of the most interesting and advanced we have seen, for many noteworthy additions to our raw and semi-finished materials were on view for the first time. There were many new and excellent machines, while the moulding section showed its medals in no uncertain way, in new applications and in new designs.

The industry progresses at such a rate that it is impossible to report adequately on the complete exhibition in one issue, and we are compelled to hold over much to our July number. Even to describe the so-called outstanding, which generally means new, is difficult for there were so many. If we can make an attempt it would include the Bakelite rubber-filled moulding material which introduces a new element of flexibility and non-cracking properties to the industry, and the same company's alkyd resin X51, which was being put through its paces on the brilliant "Twin-O-Matic" presses of Jackson, Heywood, Ltd. It would include the largest polystyrene moulding in the country for the refrigerator industry produced by British Moulded Plastics, Ltd., the Berry water-heater cover moulded by Moulded Products, Ltd., the excellent glass fibre/polyester structures of Thermo-Plastics, Ltd., the new high-strength units made of the Cobex of BX Plastics, Ltd., "silver"-coated cellulose acetate sheet (continuously coated by the vacuum distillation process) on the stand of Utilex, Ltd., the battery-driven "Velox" motorcar model, beautifully moulded and made from Courtauld's tough cellulose acetate, and the same company's technical productions in the textile field. It would include hammers for panel-beating with polythene and nylon heads by Thor Hammer Co.; it would include the new printing on p.v.c. shown on the stands of Dunlop Special Products, Ltd., and of Vinatex, Ltd.—a printing that raises the standard above anything that we have yet seen—and Vinatex's own productions of "leathercloth." It would show E. K. Coles' large lampshade and cistern-float, what strides have been made in nylon moulding by Punfield and Barstow, and Plastics Engineers, Ltd., the specially fine production of a large casing and keyboard for the Underwood adding machine made of phenolic, urea and acetate-butyrate mouldings by Insulators, Ltd.; tool handles of cellulose acetate butyrate injection-moulded by Lacrinoid Products, Ltd., and similar handles from the same material extruded by Melwood Thermoplastics, Ltd. It would include the new Bipel pelleting machine, the Jackson Heywood triple "Twin-O-Matic," the Windsor RC.200 extruder, the Foster, Yates and Thom "Lancastrian" 50-ton fully automatic press, the latest preheating and H.F. welding machines of Radio Heaters, Ltd.; and that would be only half the tale.

We have said at the beginning of these notes that the 1952 B.I.F. has been a perplexing one. It was so, because, in spite of the above attractions, attendance by serious buyers and inquirers was very patchy, especially at Earls Court. Certainly here the quality of the exhibits could scarcely be blamed, for most were excellent, and the British Plastics Federation's combined members' stand, which we were prepared to damn with faint praise, was a considerable improvement on the 1951 collection—the windows were much larger and offered much more scope for individuality. However, while many exhibitors were disappointed, some were very pleased with results, so it is difficult to draw conclusions.

Among the most satisfied were the machine makers, many of whom claimed concrete orders not only from inquirers in this country, but also from overseas visitors. Several manufacturers of new types of moulding press stated that orders and inquiries had been received from Australia, Sweden, Switzerland, Argentina, Brazil, Belgian Congo, S. Africa and India. The machine makers were congregated in Castle Bromwich, but the only machine exhibitor at Earls Court, Radio Heaters, Ltd., also reported excellent business.

Glass Fibre Reinforced Plastics Convention

THE above convention held on 12th and 13th May, at Ashorne Hill, Leamington, under the chairmanship of Sir Hugh Chance, M.A., and organized by Fibreglass, Ltd., was most successful and attended by some 180 scientists and technologists. The success was not only due to the importance this "new industry" has assumed in this country, but also due to the delightful surroundings in which the Convention took place and the excellent arrangements made by Mr. H. V. Blake, of Fibreglass, Ltd., to whom and to his directors our special thanks are due.

While so much has been done in the U.S.A. with the new material (a special section of the Society of Plastics Industry, U.S.A., has been formed to correlate and distribute information regarding it) much basic work has also been carried out in this country. Indeed, Ashdowns, Ltd., of St. Helens, by means of its relations with the glass fibre industry, have been experimenting and manufacturing for some seven years, confining production in the main to the important electrical field of application. Thermo-Plastics, Ltd., have also done sterling work in the radome field, as also have numerous aircraft manufacturers. The main difference between the two countries lays, so far as polyester resins are concerned, in production rates; in this country there are the two producers only, but there is promise of others. With presumably limited supplies available, almost all is diverted to high priority production. This explains the fact that the American industry is rapidly producing, in addition to special government orders, objects of public utility of great technical importance, in much greater variety than here.

Of special interest was an exhibition of both American and British productions which clearly showed the difference between the two trends. Among the American examples were a suitcase, the main carcass of a vacuum cleaner, an outboard motor housing, a tub-unit for an automatic machine, a chair designed in the modern manner, a piece of body armour, a ventilating fan and helmets. The British productions were represented by a main airduct pressure system on the Comet, a food storage unit also for the Comet, a press forming tool

made by Bristol Aeroplane Co., laminated board for electrical purposes and corrugated sheet some of which was "transparent," made by Ashdowns, Ltd., moulded panels and glass fabric mouldings by Microcell, Ltd., and finally some special samples by Marston Excelsior, Ltd. It is a pity that there was not on show the experimental roof for a motor coach we saw last year at the works of Thermo-Plastics, Ltd. It would, at least, have shown we can produce very large fabrications indeed in glass fibre laminates. As already indicated in these pages, we are also producing boats and fishing-rods.

The main purpose of the Convention was the reading of a number of papers by eminent scientists and technologists in this field, the most eagerly awaited being two papers by Mr. C. E. Bacon, of the Owens Corning Fibreglas Corporation. Abstracts from the first he delivered, we publish on another page in this issue; abstracts from the second, on "Applications for glass/resin laminates," we shall publish in our next issue, with those other papers that were read. Some of the applications he mentioned were seen in the exhibits described above; he probably impressed the economic section of his audience most with the statement that ten million fishing rods have already been produced. Our manufacturers have not yet reached that production!

We were especially glad to hear Dr. Yarsley deliver his paper on the chemistry of polyester resins. It was, generally speaking, elementary in character so as to satisfy a very varied audience, and it was all the more difficult to construct for that reason; nevertheless it was satisfyingly clear and logically presented. A somewhat parallel paper on the structure of glass by H. Cole, of Pilkington Brothers, Ltd., was also simply presented and equally fascinating. A paper entitled "Glass Fibre Reinforcements for Plastics Laminates" by A. M. Dobson, who had recently returned from the U.S.A., evoked much interest and many questions regarding the "unavoidable" use of size as lubricant in the manufacture of glass fibre and the necessity for its subsequent removal, and the use of finishes such as methyl-methacrylato chrome complexes. Mr. Warburton Hall, who delivered a brilliant paper on the use of these laminates for the Services, hoped that we should one day be provided with resin impregnated fabric as a raw material ready for the moulding process and thus give us consistent quality in the finished unit. Mr. K. Hyde, of Ashdowns, Ltd., presented a paper on glass fibre laminates for electrical applications: it was especially valuable since it dealt with resin binders of glass fibres hitherto rarely discussed: phenolic, melamine and the silicones.

Moulding Powder and Shot

To confirm some of the bright spots that exist in the plastics industry mentioned in a previous editorial, I have pleasure in announcing that the Board of Admiralty has approved the use of p.v.c. for the production of foul and cold weather clothing for the Navy. I understand that this type is superseding the traditional oilskin as and when the latter need replacement. There are three main types of garment: a long coat with hood, a short smock and trousers. Initial orders have already been placed with our old friends Ioco, Ltd., and with M. Barr and Co. and Edward Macbean and Co., Ltd., all of Glasgow. Ioco, Ltd., have been producing their Plasoco garments for some time for the fishing fleets.

Blow East or North

* * *

If enthusiasm be one of the pre-requisites of success, the future of the new South Wales and Monmouthshire Section of the Plastics Institute is assured, for more than 80 guests and members attended the inaugural luncheon at the Royal Hotel, Cardiff, on May 21. J. H. Collins and T. G. A. Evans came from the Western Section, P. Russell and J. M. Clarke from the Midland Section, J. L. B. Yarker from the Yorkshire Section, and H. Barker from the N.E. Section; a big contingent which included Messrs. Aplin, Birrell, Graesser-Thomas, Hartley, Mendl, Oakhill and Todd, travelled from the far east to give the new-born a rousing "send-off." Dr. E. M. Evans welcomed the guests and told us, to our surprise and pleasure, that almost all the credit for its formation was due to the energy of J. H. Collins. Mr. E. H. Vokes gave us some information on what had already been done—there were already 53 members and that facilities for holding meetings had already been offered by the local education authorities. Mr. Graesser-Thomas, the chief guest, related the story of the growth of the Institute from its small beginnings in 1931, and its early peripatetic meetings in a large number and variety of pubs to its present eminence of 1,800 members, most of whom seem now to foregather annually in four-star hotels. He also told us what the Welsh had done in our island story and from the flash in his eye, the song in his voice and his final cry of "Nid oes unrhyw rhwystr na ellir Cymry i orchfygu!" we were given a faint clue of his own origin. We all cheered. For the completely uneducated I might add that this means "There is no barrier the Welsh cannot overcome." A unique well-deserved compliment was paid to Mr. J. H. Collins, for he was asked to take the Chair at the business meeting that followed. Dr. Evans was elected Chairman of the Section, and Mr. E. H. Vokes was elected its honorary secretary. May it prosper!

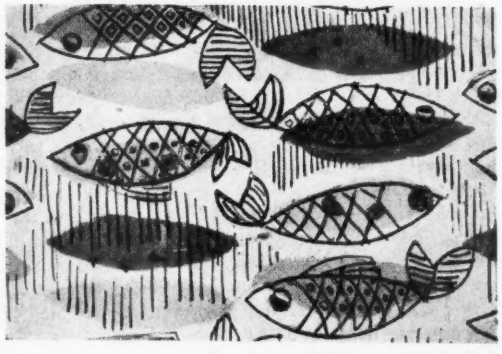
South Wales Section

* * *

The Royal Society of Arts makes an annual offer of bursaries to aid young British designers who are engaged in, or intend to enter, branches of industry in which design is of primary importance. In 1951 a competition was organized for designs which covered p.v.c. plastics sheeting and laminated plastics. The results have now been published, Miss Rhona Park receiving a £100 bursary for a clever design on bathroom curtains and Miss Olivia Black a bursary of £50 for a design on a tablecloth. No award was made for laminated plastics, since the designs submitted did not come up to standard. I show here Miss Park's design, which is pleasant indeed. I like Ermyntrude, the little female fish (left centre) with the coy glance and rather despondent tail; I do not like Jasper (bottom right) with the gleam in his eye, tail well up and going her way. I suppose they call such fellows "sharks" in their world. I like this design, especially because you can look at it upside-down with equal pleasure—in fact, I may have published it upside-down!

DOGSBODDY.

Special Prize for P.V.C.



Post-Fair Notes from the 1952 B.I.F.

THE British Industries Fair this year has again given an indication of the contribution which plastics are making to the progress of industry in this country. New materials, new uses for accepted and recently introduced materials, new techniques, processes and products show the way in which an increasing number of manufacturers now take advantage of the plastics industry's products and services.

Focus of Plastics exhibits was naturally in the plastics section at Earls Court, with a total of 55 exhibitors. The stand of the British Plastics Federation, besides providing general information service about plastics matters, combined display and reception facilities for a number of its members. Each company had a display showcase, and the exhibits on these are illustrated and described on following pages.

An additional and central feature of the plastics section was the exhibit of a plastics aircraft wing, developed by the Royal Aircraft Establishment at Farnborough, which first caused so much interest when it was shown at the Society of British Aircraft Constructors Exhibition last September. The constructional technique was demonstrated by a number of diagrams and sections cut in the wing to show the split wing construction. Considerable progress is being made in this field and the Ministry of Supply has estimated that an all-plastics aircraft may be flying within two years.

The main products and exhibits of the manufacturers at the plastics section of the B.I.F. were described in a stand-by-stand preview last month. We include below specific details of some of the exhibits which were omitted from last month's description. For complete analyses of those exhibits not included here, reference should be made to the previous notes. In some cases the main exhibits were seen at Birmingham and these will be described in the next issue of "Plastics."

Experimental plastics aircraft wing made from phenolic resin bonded asbestos felt exhibited by the Ministry of Supply in the Plastics Section of the B.I.F.

Earls Court—Plastics Section

British Plastics Federation Stand

British Industrial Plastics, Ltd. The design service created by this company to advise moulders and potential users of moulded components was demonstrated by three of their suggested designs for articles using "Beetle" melamine mouldings. Each was shown by the initial drawing of the project, a portion of an engineering drawing giving details of the tool design and, finally, a prototype of the actual article. The three subjects chosen were a radio cabinet, a weighing machine and a range of tableware.

Cascelloid, Ltd. The outstanding exhibit among a variety of products showing the use of plastics film, sheet and mouldings in the field of packaging was a five-gallon blown polythene bottle which is now in production. The fact that the well-known advantages of the polythene bottle can now be practically applied to this size of container should have a great effect on the transport of chemicals, particularly of corrosive materials.

E. K. Cole, Ltd. The new "Diakon" acrylic lampshade follows the trend towards large injection mouldings in preference to sheet forming. The newly developed two-colour moulding technique has been used to produce adding machine key tops for the National Cash Register Co. The polystyrene cistern float which was shown in its experiment stages last year has been under test by various organizations and is now in full production. Being tough and light in weight, resistant to corrosion it has the added advantage of being easily manufactured from a material in good supply.

Crystalate, Ltd., Ebonestos Industries, Ltd., and Mica Products, Ltd. A domestic timer made by Smith's English Clocks, Ltd., is one of the most interesting productions seen here. The moulded components include a black "Bakelite" phenolic housing, a red knob and base and a clear transparent dial cover through which passes the control knob. The instrument has been beautifully designed for good appearance and for ease of cleaning. A mothball container—another recent job—consists of two polystyrene mouldings cemented to form a ring in which the mothballs are placed, and a hook for hanging the ring among coathangers. The uncertainty of metal supplies has drawn attention again to the moulding of lipstick cases. This is a job requiring remarkably close tolerances, but Mica Products, Ltd., have moulded a very good case for use by Pond's. Somewhat outside the normal run of moulding jobs is the manufacture of cable ducting for aircraft from "Durestos" phenolic-bonded asbestos felt.

Hornflowa, Ltd. Wall panels with a hard glossy melamine surface are introduced in plain and mottled colours. They can be on a hardboard base or, where great wear is likely, the finish can be applied to paper laminates.

Insulators, Ltd. The centre of attraction on this showcase was undoubtedly the new moulded case for an Underwood Elliott Fisher, Ltd., adding machine. This intricate moulding had to be produced to exact dimensions since all parts are interchangeable with the equivalent U.S.-built machine. In addition to the large housing, phenolic material is also used for the keyboard frame and platen knobs, whilst the ribbon cover plate is moulded in urea and the keys from cellulose acetate butyrate.

Lacrinoid Products, Ltd. Screwdriver handles which are injection moulded from cellulose acetate butyrate are the most recent addition to this company's products. This method of production is, of course, much faster than machining extruded sections, which has previously been done with success.

E. Shipton and Co., Ltd., and Industrial Appliances, Ltd. Seeing the wide range of sizes, shapes and surface textures of the "Poly-tainers" made by Shipton's for Industrial Appliances, Ltd., it is easy to believe the company's claim that this is the largest range of such bottles in the world. Although one can select almost any type from the range, special shapes can also be manufactured. One new idea is a stopper in red polythene, for the one-gallon bottle, designed to fit any type of standard spanner to facilitate good sealing and easy opening; another accessory is a screwed-in attachment to give a spray at right angles to the top of the bottle.

Utilex, Ltd. The metal-coated cellulose acetate film shown here created great interest. This is produced by high vacuum evaporation of aluminium in almost monomolecular thickness.

Tenaplas, Ltd. Thin highly plasticized p.v.c. tape with polished surface is intended for use in electrical insulating work. The self-adhesive effect of highly polished p.v.c. is used with advantage, but application of heat seals the overlaps in the tape to give a uniform sheath. Another new development is the simultaneous extrusion of a series of differently coloured tubes side by side for the conveyance of gases and liquids.

Individual Stands

BX Plastics, Ltd. On the largest individual stand in the plastics section, the company showed the many new and established thermoplastic materials produced. "Cobex," the new vinyl copolymer sheet, is now available in several plain and mottled colours and also in a thin transparent grade which has very good clarity. Deep-drawn articles such as caravan sink units were shown, and their toughness demonstrated—by visitors to the stand stamping on the mouldings and hitting them with a mallet without being able to break or dent the objects.

Plasticized p.v.c. is now available in thick transparent grades up to 0.06 in. The 0.04-in. thickness is used to make a folding rear screen for a convertible coupé motorcar. Thin polished p.v.c. tape has been developed for use in cable jointing and similar repair work For best results the wrapped joint or sheath should be stoved to fuse overlapping layers of tape.

A number of standard "Bexol" solutions are now being introduced. In the majority of cases, however, when resin solutions are required, these have to be selected or formulated to the specific job required.

Commercial Plastics, Ltd. Two thin sheets of p.v.c. laminated together as they leave the calender avoid any possibility of pin holes in the material, thus making them particularly useful for inflatable toys. The two-colour effects available by this means are also of value in the bag and fancy goods trade.

Courtaulds, Ltd. One of the finest cellulose acetate mouldings shown to demonstrate the use of Courtauld material is a very small chassis for the Multitone "Selector" hearing aid, moulded by Fraser and Glass, Ltd. This intricate job is truly amazing, considering the size of the moulding and the fact that it is made by injection. For the first time Courtaulds showed some of the phenolic moulding which they produce for their own spinning factories. We understand that they are now prepared to accept outside work as trade moulders.

Dunlop Special Products, Ltd. The main interest here was the great variety of printed patterns made possible by recent technical advances in the multicolour printing of thin p.v.c. sheeting.

Flexigrip, Ltd. Two interesting uses of the extruded slide fastener used in conjunction with p.v.c. sheeting are the laundry bag manufactured by Columbia Products, Co., Ltd., and the radio component packs used for the export packaging of "Marconi" transmitter equipment. In the latter case the seal made by the slide fastener is of great importance for the prevention of corrosion.

Imperial Chemical Industries, Ltd. An abstract figure composed of a great variety of I.C.I. plastics is the main feature of the stand. The particular materials which are arousing most interest at the moment are the "Nuron" polyester resins, polytetrafluorethylene and rigid p.v.c. sheeting.

Play-Fab, Ltd. A new exhibitor to the Fair, this company of injection moulders showed polystyrene models of the Comet airliner manufactured for B.O.A.C., display bases for Elizabeth Arden cosmetics and gilt-sprayed polystyrene miniature picture frames.

Plysu Products, Ltd. Showing at the B.I.F. for the first time, the company's activities are principally in the field of high-frequency welded garments for rainwear and industrial protection. One suit of protective clothing, designed to stand up to a very corrosive fluorine compound used in atomic research at Harwell, is fitted with a quick-release outfit. Whereas standard p.v.c. sheeting is attacked by this chemical in less than a second, the special grade used stands up against fumes and splashes for 15 seconds, giving the operator time to get clear in case of emergency and to discard the clothing before it is penetrated. A new mop consisting of a cellulose sponge on a hinged polystyrene moulding also drew much attention. By moving the hinged portion the mop is automatically wrung out.

Stanley Smith and Co., Ltd. Shown for the first time was "Vitrathene" polythene sheeting for the fabrication and lining of chemical equipment. Rigid p.v.c. sheeting with polished surface was seen formed for a refrigerator door liner and other objects. Flexible p.v.c. now includes a highly transparent press-polished sheet and embossed transparent sheeting giving a "frosted glass" appearance. The use of rigid p.v.c. for outdoor signs such as are used by road workers was also shown.

Stone and Simmons. Three items have been added to the range of household articles made by the company. A soap dish which requires no fixing and is readily attached to an ordinary tap; a manually operated food mixer with a polystyrene measuring jug as its base container; and a sundæ cup, moulded, like the other articles, in polystyrene.

Thermo-Plastics, Ltd. A new "Perspex" fabrication job of very sturdy construction was an oxygen tent cover, completely transparent. A set of small coffee cups with a tray, in tinted transparent "Perspex" makes an attractive addition to the range of tableware.

Plastics in Other Sections

Earls Court—Furniture

Goodearl Bros., Ltd. A new bedroom suite makes use of grey embossed p.v.c. as a facing material for vertical surfaces and a weave pattern laminate for the dressing table top.

Hardura, Ltd. A floor covering made by putting a layer of water-resistant and abrasion-resistant p.v.c. on a felt backing. This has been used by Ford's in cars and is widely employed as an interior floor covering. One interesting use of the material is as an indoor portable sports court, enabling floors in public halls to be used for badminton or similar games, without damage to the permanent floor.

Earls Court—Sales Services

Kennet Interchangeable Price Markers. Although it is exhibited at the B.I.F. for the first time, this price-marking unit has already met with great success. Moulded cellulose acetate numerals are slotted into a black base extruded from rigid p.v.c.

Zell-Em, Ltd. New versions of display signs made from polished self-adhesive p.v.c.

Earls Court—Textiles

H. R. Denne. Plastic collars are manufactured in a large variety of styles.

Olympia—General

Siegrist-Orel, Ltd. The two overlapping blades of the tiny "Orel" knife sharpener are set in a moulded polystyrene handle.

Olympia—Scientific and Optical

Apis Engineering and Research, Ltd. A magnetic stirrer may be used in vessels which must be kept at high pressure or under vacuum. To protect the magnetic stirrer bar from corrosion and to give it mechanical protection, it is coated with a layer of polythene.

Loma Electronic Equipment, Ltd. Metal detector developed for the food industry is also useful for checking plastics compounds, especially before calendering.

Pifco, Ltd. Massaging equipment, hair drier, etc., in white urea housings. Plastics mouldings are also used for table lamps, fairy lights and nursery lamps.

Olympia—Chemicals

B.B. Chemical Co., Ltd. Standard and special adhesives, mainly based on rubber, for bonding different materials, including plastics.

A. Boake Roberts and Co., Ltd. Solvents and plasticizers for the plastics industry including phthalates and phosphates. Stabilizers and mould lubricants.

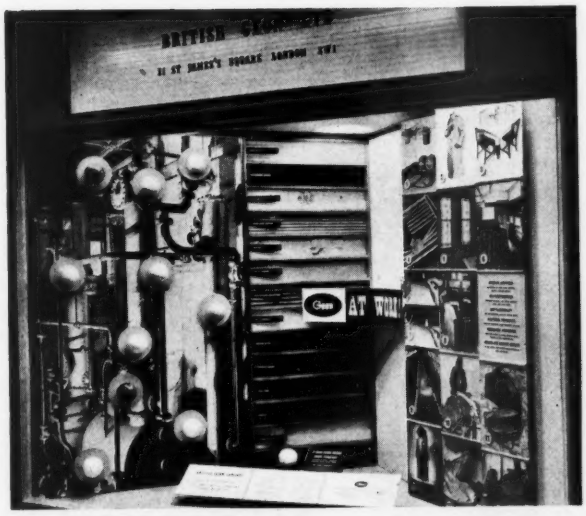
Croda, Ltd. Hot-melt coating based on ethyl cellulose for anti-corrosive and mechanical packaging for tools, components, etc.

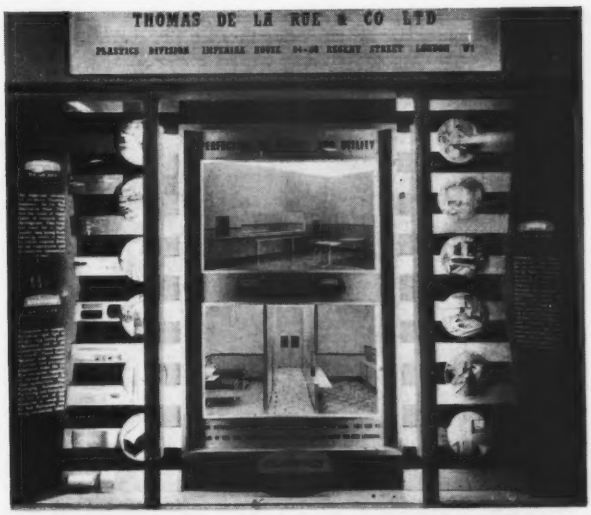
Distillers Co., Ltd. This group has several members actively interested in the plastics industry. These are British Resin Products, Ltd., British Geon, Ltd., both already mentioned for their Earls Court exhibits, and British Industrial Solvents, Ltd., who supply solvents and plasticizers to the industry.

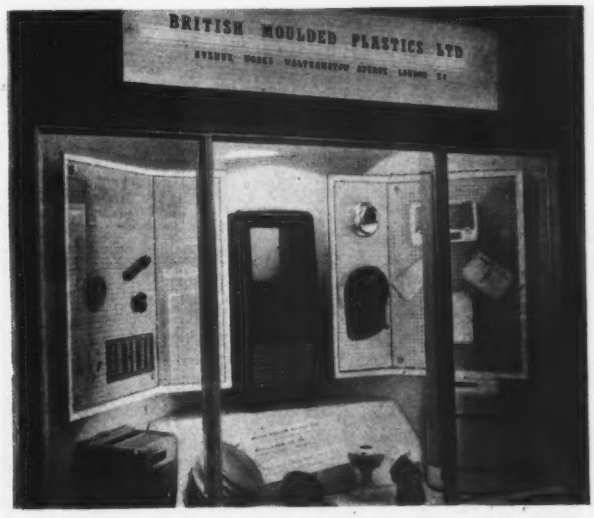
(*Continued on page* 169.)

Members' Exhibits on the composite stand of the British Plastics Federation

B.I.F. 1952

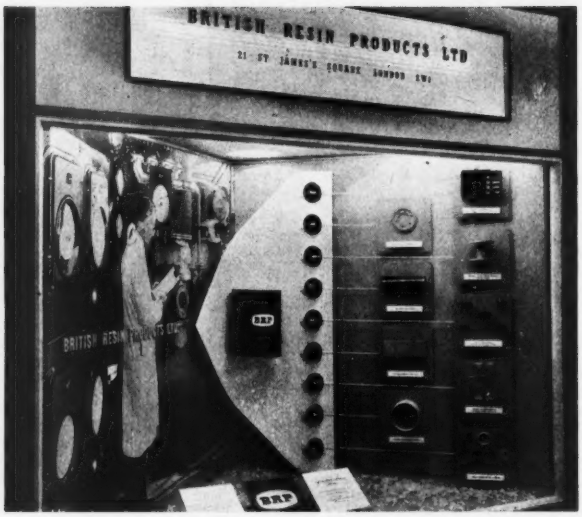






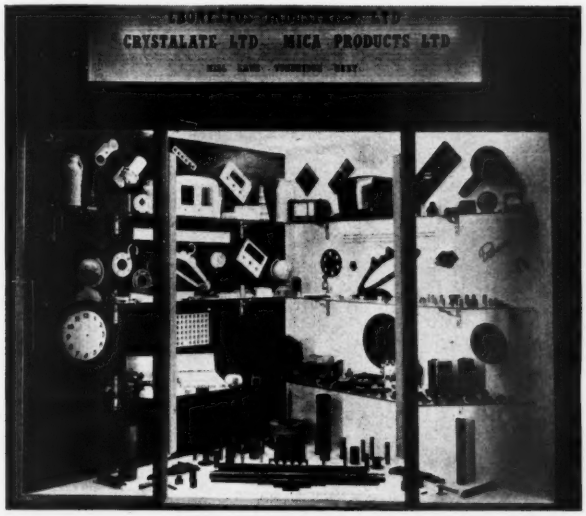
B.I.F. 1952

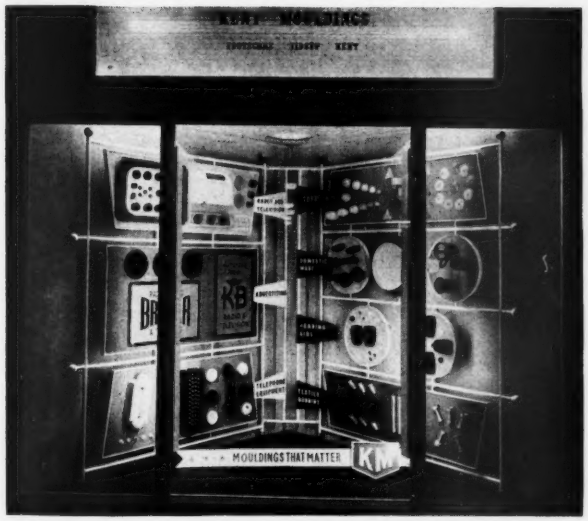
Members' Exhibits on the composite stand of the British Plastics Federation

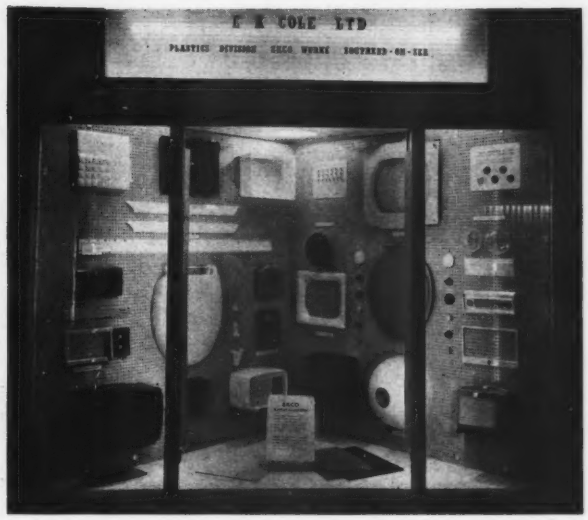


Members' Exhibits on the composite stand of the British Plastics Federation

B.I.F. 1952

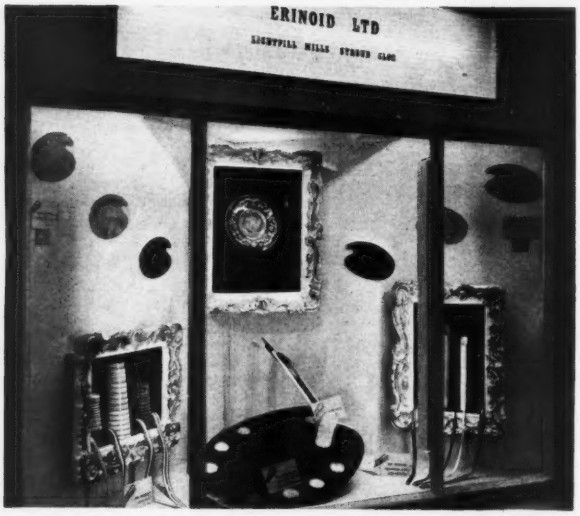


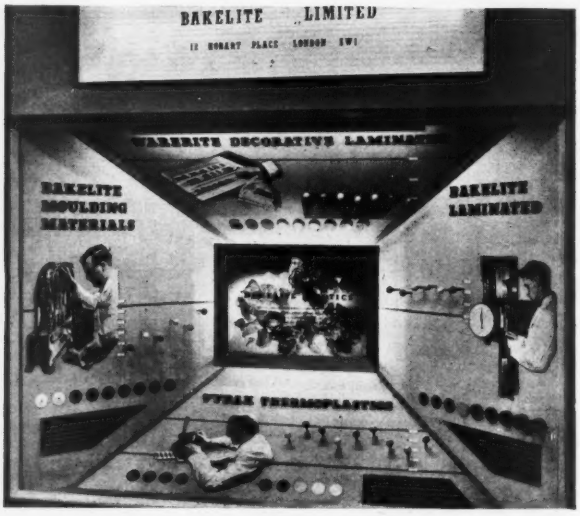




B.I.F. 1952

Members' Exhibits on the composite stand of the British Plastics Federation





Members' Exhibits on the composite stand of the British Plastics Federation

B.I.F. 1952

Other exhibits which were in the Plastics Section of the Fair at Earls Court are illustrated on pages 166-168.

The plastics materials, mouldings, extrusions, etc., at the Birmingham Section of the Fair, including further exhibits by members of the British Plastics Federation, will be illustrated and reviewed in our July issue.

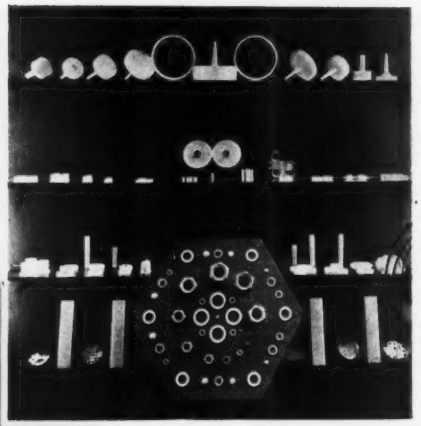
A description and illustrations of the plastics machinery exhibited at Birmingham will be found on pages 170-172.

K

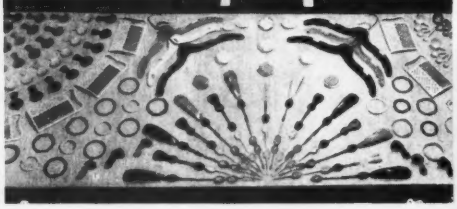
B.I.F. 1952

Other Exhibitors in the Plastics Section at Earls Court

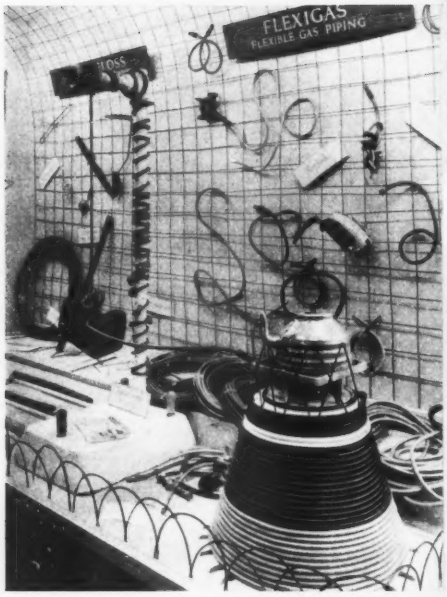
(Left) Domestic uses of "Duvina" colour - printed p.v.c. sheeting is demonstrated in this corner of the Dunlop Special Products, Ltd., stand.



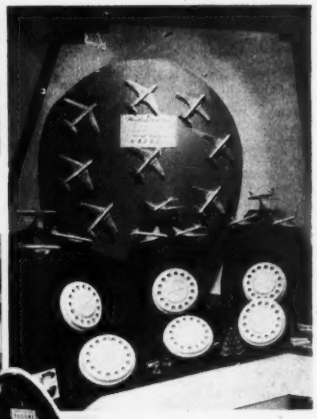
(Above) Nylon moulded components and rings, blocks, etc., for machining were shown by Plastic Engineers, Ltd.



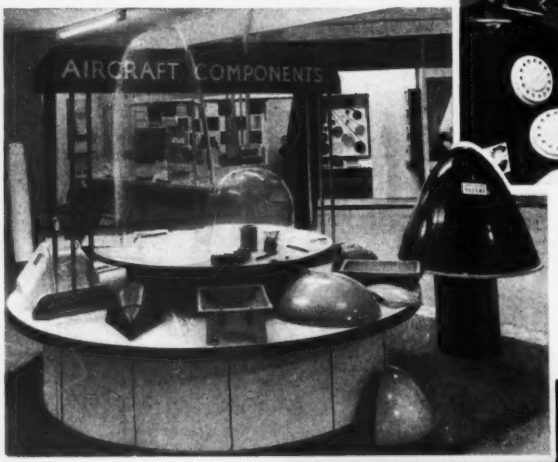
(Above) Injection Moulders, Ltd., show domestic articles in cellulose acetate and polystyrene.



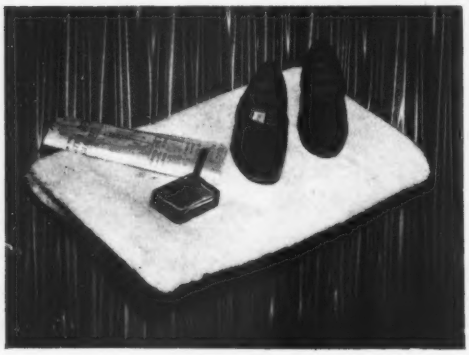
(Above) Strength of "Flexigas" by Creators, Ltd., is shown by hanging a 56-lb. weight from the tubing as it carries gas to boil a kettle.



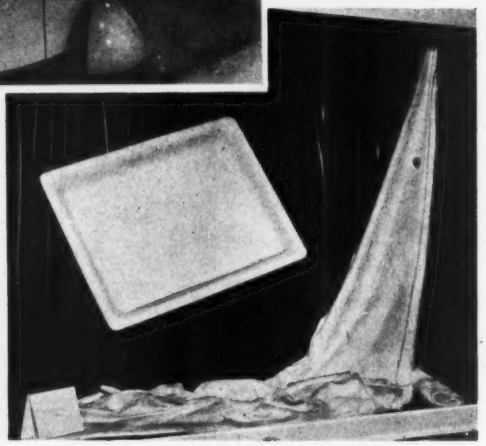
Advertising models of the "Comet" airliner for B.O.A.C., and cosmetics display stands for Elizabeth Arden, are moulded by Play-Fab, Ltd.



(Above) Some of the aircraft components manufactured by Thermo-Plastics, Ltd., from "Perspex," "Bakelite" laminated, reinforced cellulose acetate and glass/resin laminates.



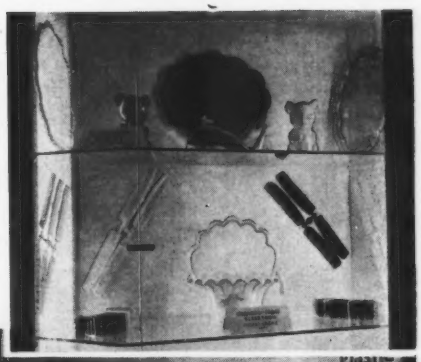
(Left and right) Two panels selected from the B.X. Plastics, Ltd., stand shows the use of black polished p.v.c. sheet for manufacture of slippers, and pink "Cobex" for a shaped tray.



Other Exhibitors in the Plastics Section at Earls Court

B.I.F. 1952

(Right) Selection of typical articles moulded from "Kleestron" polystyrene moulding powder made by O. and M. Kleemann, Ltd.

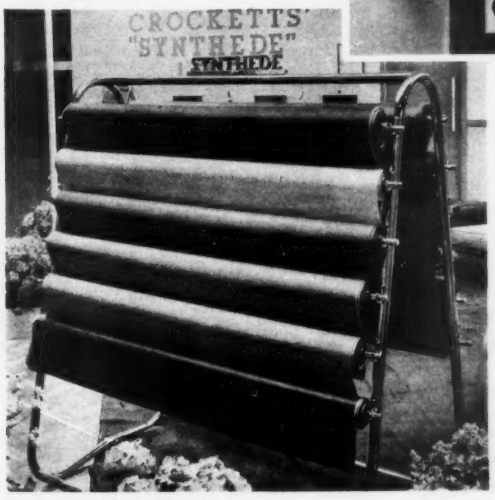


(Above) Handbags take up a large part of embossed p.v.c. sheeting production. These bags and sandals are made from Commercial Plastics, Ltd., materials.

(Left) Embossed floral effects for furnishing and upholstery supplied by Duraplex (Plastics) Ltd.

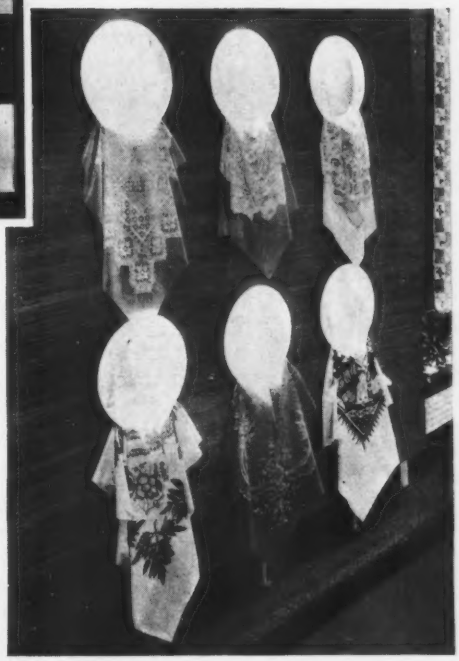
(Above) Laundry satchels and radio component packs make use of "Flexigrip" extruded slide fasteners, made by Flexigrip, Ltd.

(Below) Cloth-backed sheeting made by the Leather Cloth Co., Ltd., includes p.v.c., nitrocellulose and oil based types.



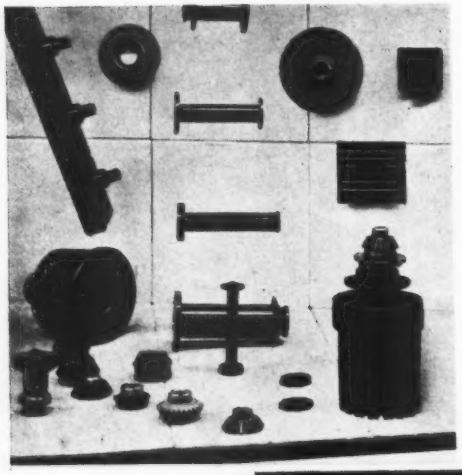
(Above) An unusual application for thin printed p.v.c. is this lampshade, covered with material by Storeys of Lancaster (Storey Bros. and Co., Ltd.)

(Right) Printed table covers in a variety of colours and patterns are products of Vinatex, Ltd.



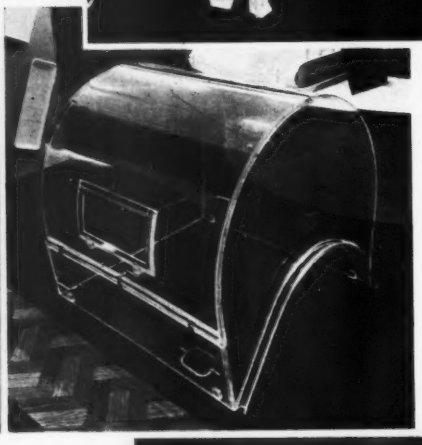
B.I.F. 1952

Other Exhibitors in the Plastics Section at Earls Court

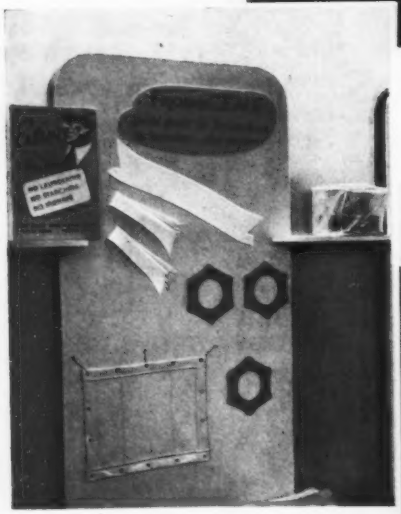


(Right) Industrial protective clothing and gloves were exhibited by James North and Sons, Ltd.

(Above and right) Courtaulds, Ltd., make thermosetting mouldings (above) for their rayon spinning equipment; they also supply cellulose acetate moulding powders, applications for cellulose acetate being shown (right).



(Left) This oxygen tent cover, a fine example of "Perspex" fabrication, was shown by Thermo-Plastics Ltd.



(Above) A semi-stiff collar made from "Fromocene" sheet, a portion of perforated cinema screen material and gaskets were among p.v.c. products shown by Wallington, Weston and Co. Ltd.

(Above and left) Uses for rigid p.v.c. sheet made by Stanley Smith and Co., Ltd., include refrigerator door liners and printing plates; polythene sheeting is used in the fabrication of chemical apparatus.

(*Continued from page* 160)

The Dohm Group of Companies. The parent company is engaged in reprocessing all types of thermoplastic scrap and compounds. A subsidiary, A.E.R. (1939), Ltd., is engaged in the vacuum coating of plastics. Another use of plastics is for the "Flexi-mould" hot-melt compound used for making flexible moulds for castings.

Howard and Sons, Ltd. Chemicals of interest to the plastics industry are ethyl lactate, sodium lactate, sextol phthalate, sextone, sextone B and sextol stearate.

Monsanto Chemicals, Ltd. Best known in the plastics industry as manufacturers of "Lustrex," polystyrene, Monsanto made a greater feature this year of "Arochlors" the chlorinated diphenyls used also as plasticizer extenders for p.v.c.

Petrochemicals, Ltd. The company manufactures a wide range of chemicals from petroleum and many of these are of interest to the plastics industry.

Shell Chemicals, Ltd. Among the petroleum-derived chemicals made by this company are the "Epikote" epoxy resins. used in surface-coating and adhesives applications.

Vinyl Products, Ltd. The products shown here were the polymer emulsions based on acrylics, but mainly on vinyl acetate. P.V.A. emulsions are finding increasing use in paints, flooring compositions, paper coating, printing inks, adhesives, etc.

Watford Chemicals, Ltd. Among the products of the company are moulding powders, plasticizers and solvents for plastics.

Olympia—Chemists Supplies

P. B. Cow and Co., Ltd. P.V.C. products include balls, rainwear, baby pants, etc. Nursery ware moulded by London Moulders, Ltd., is distributed by this company.

New Hygiene, Ltd. Deodorants, disinfectants, etc. are packed in "Poly-tainer" polythene bottles. Plastics mouldings also house solid deodorant blocks. For permanent fixing in bathrooms and kitchens.

William Sessions, Ltd. Self-adhesive labels may be applied to a number of plastics surfaces including polythene, which is notorious for difficulty of adhesion. Various hand-operated and automatic machines are available for dispensing the labels.

Olympia—Brushware

Halex, Ltd. Besides a wide selection of toothbrushes, hair brushes, etc., the stand showed the large range of "Bex" domestic ware including food containers, measuring jugs, condiment sets, etc. Halex are now going into production with a range of melamine tableware. Each article sold by the company carries an informative label stating the material from which it is made and how it should be treated in use. On the same stand the jewellery and fancy goods of Scintillex, Ltd., were displayed.

Olympia—Office Equipment

E.M.I. Sales and Services, Ltd. The "Emidicta" dictating machine makes use of a variety of plastics components including earpieces and tubes for the stethophones, the housing of the hand microphone and various minor moulded components.

Dictaphone Co., Ltd. The latest model of the "Dictaphone" machine has several details of interest from the point of view of plastics. The actual belt on which messages are recorded is manufactured as an extrusion in cellulose acetate butyrate, 0.005-in. thick and 12 ins. in circumference.

Olympia—Music

British Piano Actions, Ltd. A keyboard and piano action designed for tropical conditions makes use of synthetic resin glues throughout. Plastics material is used for the key tops, whilst sharps are in moulded phenolic material.

Olympia—Jewellery

S. Elsky. The "Crusader" dry shaver in a moulded plastics body uses a repeated pushing action of the hand to revolve the cutting blades.

Design and Research Centre for Gold, Silver and Jewellery Industries. The centre is carrying out experiments and gives advice on the high vacuum technique of metal coating for plastics.

Olympia—Fancy Goods

A.B.C.D. Plastics, Ltd., and W. L. Lawler Plastics, Ltd. Moulders of urea lamp fittings, etc., and fabricators of "Perspex." New products include a "Perspex" television lamp to reduce strain whilst viewing, a urea soap saver and a number of table lamps.

Aberdeen Combworks, Ltd. New designs in combs and toys.

Combex, Ltd. Plastics toys and fancy goods, costume jewellery with metallic finish.

A. C. Gill and Cleaver, Ltd. "Nyloklix" nylon press studs.

D. Harris and Co., Ltd. Klix powder compacts incorporating pictorial or decorative design behind a transparent polystyrene moulding. The same principle is employed for backing a small hand mirror.

Hillier Engineering Co., Ltd. Table model and car model cigarette lighter with urea housing.

E. R. Holloway, Ltd. Injection moulded and cut combs. Welded p.v.c. comb cases and similar welded goods.

Jarret Rainsford and Laughton, Ltd. Plastics tableware and fancy goods, phone pads, etc.

Jekmoth Home Stores, Ltd. Clothes storage bags in plain and quilted p.v.c., using the "Flexigrip" fastener to give mothproof seal.

Mendle Brothers, Ltd. A number of new mouldings for domestic ware including a tray with attachment for clipping to an armchair, a large cheese dish, a polythene dish scraper, a new bath rack and a variety of cake plates. A three-in-one dish may be used for food storage, as a flat dish with cover or as an open dish with saucer.

Newey Brothers, Ltd. The "Tip Top" dream curler is injection moulded in soft p.v.c. and cannot hurt the user's head.

L. Orlik, Ltd. A new tobacco pouch uses a p.v.c. extrusion as a sealing device.

P. Sedley. "Klos-Klips" consist of a stainless steel spring into which are moulded two plastics jaws. Being of simple strong construction they should have an indefinitely long life.

Stokes Fountains, Ltd. The main bowl and housing for this fountain are shaped and moulded from plastics materials. Two versions were described in "Plastics," January, 1952, p. 21.

S. D. Sullam, Ltd. A small internally illuminated Yule tree is moulded from polystyrene.

Taylor, Law and Co., Ltd. A series of "Tala" icing pins for shaping cake decorations are moulded from polystyrene.

Tedson, Thornley and Co. Cotton gloves, coated on one or both sides with p.v.c. for use as gardening gloves, for industrial work, etc.

Olympia—Stationery

Recreations and Auto-Novelties, Ltd. Fancy pencils, moulded Canasta sets, Canasta scorers, card shufflers, etc., moulded or fabricated from various materials.

Rees, Pitchford and Co., Ltd. Desk fittings, inkwells, calendars, etc., moulded in phenolics and urea. Date stamp in cellulose acetate housing with p.v.c. stamps.

Rexel, Ltd. New polystyrene dispensers for "Speedfix" pressure sensitive tape.

Olympia—Sports Goods

Millard Bros., Ltd. Plastic pellets for air guns are safer than their metal counterpart. Since they do not distort after firing they can be used repeatedly.

Olympia—Toys and Games

Abbey Corinthian Games Co. New "Flexy" blocks moulded from resilient plastics material avoid bruises to little children or damage to furniture.

Anglocentrop, Ltd. Birthday cake candle holders moulded in polystyrene.

Bell (Toys and Games), Ltd. Large selection of plastics toys, including toy camera, Mickey Mouse projector, spring balance scales, etc.

British Xylonite Co., Ltd. Cascelloid division. New toys include a "bazooka" gun moulded in cellulose acetate butyrate and firing six table tennis balls at a time as ammunition, a doll with Saran hair which can be dyed with the rinses provided, inflatable swim rings, cushions, waterwings, etc., made from laminated p.v.c. material, cellulose acetate blow moulded toys, and so on.

Chad Valley Co., Ltd. Plastics chessmen, draughtsmen, dominoes and similar games.

Grovewell, Ltd. New toys include a jet-propelled airship, a toy camera, a mechanical bulldozer and a new constructional set.

O. and M. Kleemann, Ltd. A new range of military toys moulded in khaki polystyrene.

E. Lehman and Co., Ltd. Plastics pieces for many indoor games.

Louis Marx, Ltd. Mechanical toys moulded in acetate, polystyrene and p.v.c.

J. and L. Randall, Ltd. Many plastics toys and games are included in the "Merit" and "S.E.L." series of toys.

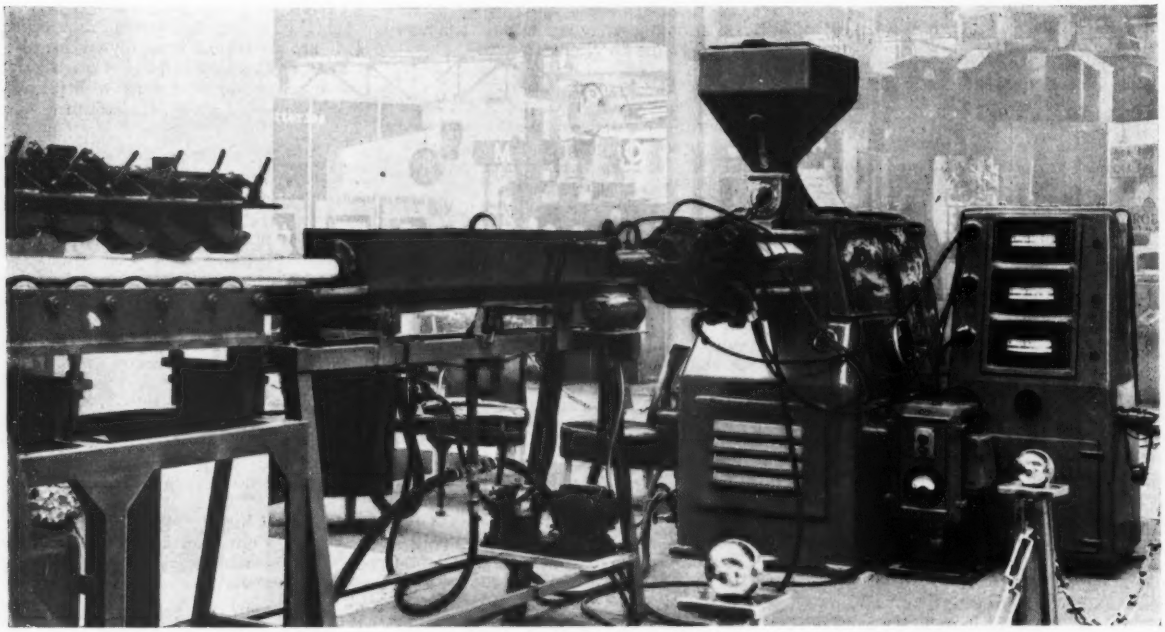
L. Rees and Co., Ltd. This company is sole distributor of the "Rosebud" dolls manufactured by Nene Plastics, Ltd.

Rovex Plastics, Ltd. Electric trains with plastics parts.

Selcol Products, Ltd. New toys include an entirely injection-moulded microscope including plastics lenses which give a magnification of 45. Musical toys now include an eight-note xylophone. An interesting novelty is an injection-moulded box handbag made of transparent polystyrene.

D. G. Todd and Co., Ltd. Plastics mouth-organs, dolls, toys and novelties.

Other exhibitors of plastics toys include: **Airfix Products, Ltd.; R. A. Clements (London), Ltd.; Cecil Coleman, Ltd.; Cowan de Groot, Ltd.; E.V.B. Plastics, Ltd.,** and **Lines Bros., Ltd.**



Demonstrating the extrusion of 2-in. rigid pipes in unplasticized p.v.c. for chemical works' use, using the R.C. 100 multi-screw extruder (R. H. Windsor Ltd.).

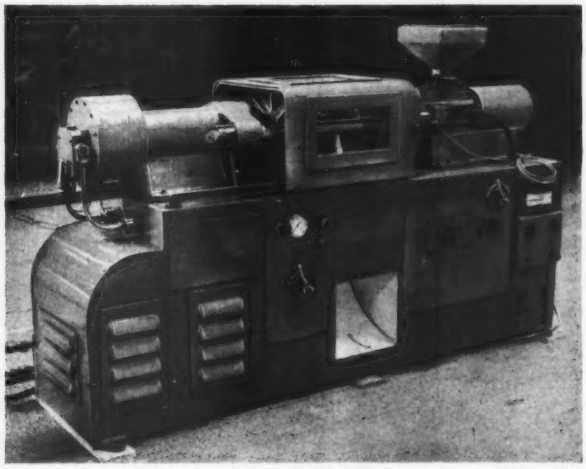
Plastics Machinery at the 1952 B.I.F.

THIS year's B.I.F. at Castle Bromwich has been notable for showing for the first time a number of new designs in machinery for the plastics industry. A new horizontal pelleting machine made by B.I.P. Engineering, Ltd., hydraulically operated to produce standard pellets of a large size, is fully described elsewhere in this issue (" Machines for the Industry," pages 181-184).

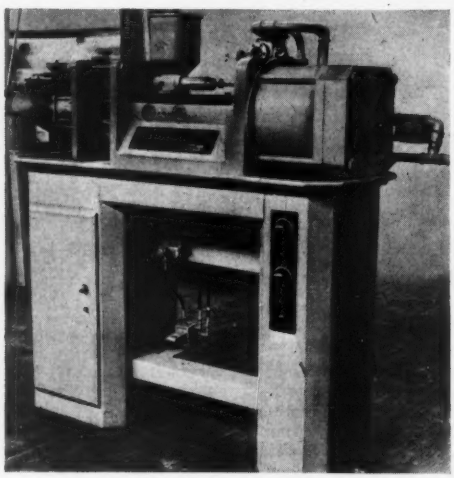
A new 1-oz. injection moulding machine exhibited by R. H. Windsor, Ltd., fills a need, in the Windsor range of machinery, for producing small mouldings. The capacity of this machine is up to 420 shots per hour and with moulding plates measuring 16 ins. by 11½ ins., the maximum area moulded is 10-12 sq. ins. The machine has a locking load of 30 tons and exerts a pressure of 20,000 lb. per sq. in. on the thermoplastics material. The injection assembly gives easy access to the sprue bush and the material cylinder.

Another new injection moulding machine of small capacity was shown by Davidsons Engineers (Manchester), Ltd. This semi - automatic machine — the " Plasticor "—produces mouldings weighing up to ¾ oz. (300 shots per hour). A pre-plasticizing unit can be supplied as an additional feature to increase the capacity of the machine to 1¼ oz. per shot. A special injection chamber for nylon can also be supplied. This machine is foot operated, and is suitable for moulding small components where inserts must be pre-loaded in the mould.

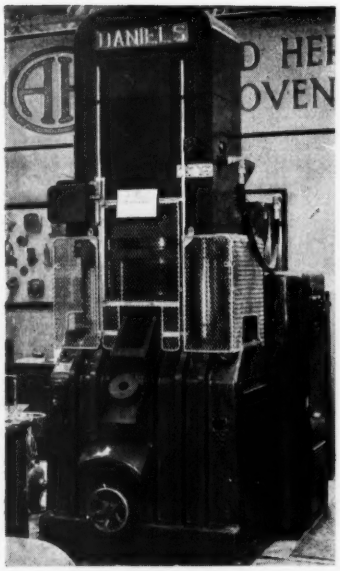
The " Twin-O-Matic " 50-ton moulding press, shown by Jackson, Heywood and Co., Ltd., will be described later in our monthly feature " Machines for the Industry." This machine is designed to take two compression moulds side by side, the platen in the standard model



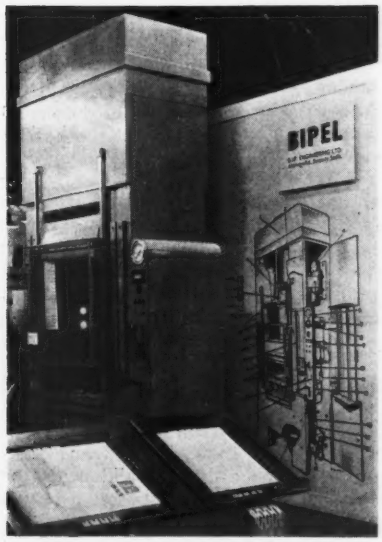
1 oz. Injection machine (R. H. Windsor Ltd.)—a new addition to the Windsor range of plastics machinery.



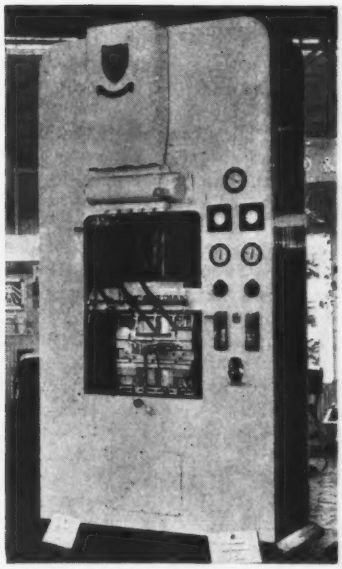
¾ oz. "Plasticor" injection machine (Davidsons Engineers (Manchester) Ltd.)



Automatic 125-ton hydraulic preforming machine for tablets up to 6 ins. diameter (T. H. and J. Daniels, Ltd.).

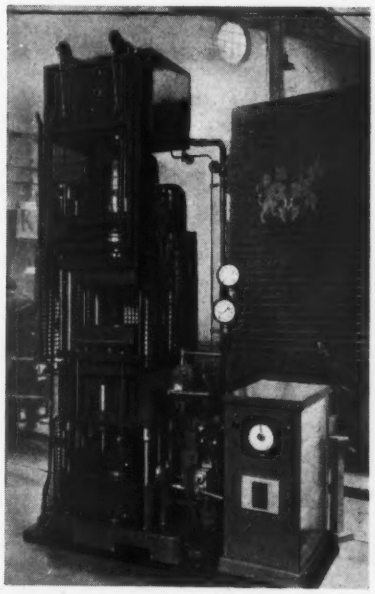


"Bipel" auto-control moulding press Type 100, for moulding pressures of 50-100-150 tons (B.I.P. Engineering Ltd.).



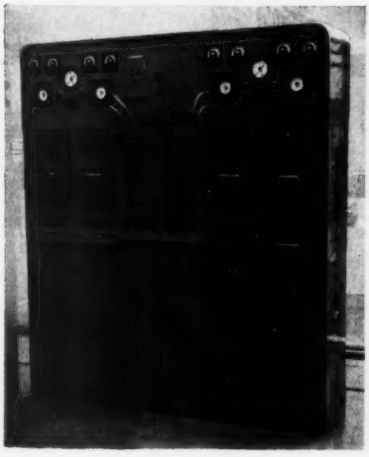
"Lancastrian" 50-ton fully-automatic moulding press (Foster, Yates and Thom, Ltd.).

Dual 50-ton transfer moulding press (Finney Presses, Ltd.).

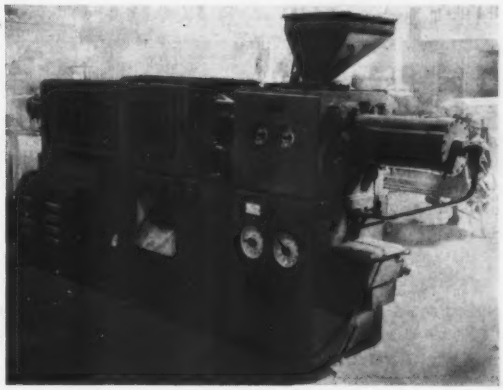


(Above) Semi-automatic 70/20-ton transfer moulding press, with time-cycle control unit (Bradley and Turton, Ltd.).

Rotary pelleting machine for pellets up to 1⅜ ins. diameter (Manesty Machines Ltd.).



(Left) Triple "Twin-O-Matic" 25-ton moulding press (Jackson, Heywood and Co., Ltd.).



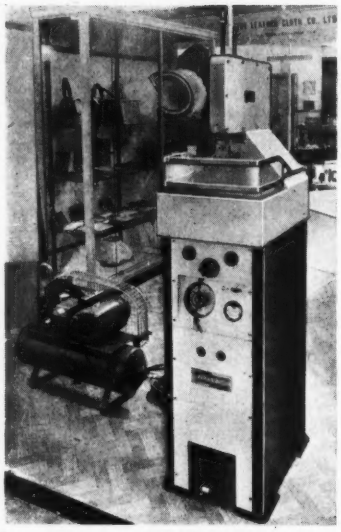
(Right) S.H.4 injection moulding machine (R. H. Windsor, Ltd.), now fitted with fully-automatic control.

measuring 14 ins. by 12 ins. In this machine the normal time taken for loading, unloading and cleaning of the moulds is eliminated from the moulding cycle, as the rams automatically alternate up and down. The machine is entirely self-contained, fully interlocked for safety in operation, and needs only to be connected to the electric power point. The controls include two automatic timing clocks, pressure gauge, four temperature indicators and controllers, two pilot lamps, two remote control stations, and thermostat pilot lights. At this stand there was also exhibited the triple "Twin-O-Matic" press, which takes three moulds side by side, as seen in one of our illustrations.

The Windsor S.H.4 injection moulding machine (R. H. Windsor, Ltd.), which is able to produce mouldings weighing up to 4 oz. at 180 shots per hour, is now being fitted with fully automatic control, whereas previously the machine has only been semi-automatic and the operator has had to press a button after every cycle of operations. The fully automatic control eliminates the time taken to restart each separate operation and thereby increases the production capacity of the machine; the machine operator can now supervise a whole battery of such machines. The new attachment not only keeps the machine running fully automatically, but brings it to a standstill if there is any obstruction greater than 5/1000th of an inch in thickness between the mould plates, which have a closing pressure of 150 tons. This means that possible damage to expensive moulds is reduced to a minimum on those rare occasions when a "shot" of material slips out of the moulds and prevents the plates from closing. The control is effected by an electrical limit switch operated on a moving plate.

R. H. Windsor, Ltd., were also demonstrating how easy it is to extrude unplasticized p.v.c. (as a premixed powder) into the form of rigid pipes and tubes, using their R.C. 100 multi-screw extruder, with a capacity of 100 lb. of plastics per hour. The technical achievement of this demonstration was not so much the production of chemical piping by the extrusion process, but the fact that the raw material fed into the multi-screw extruder was in powder form (Geon 101 and Geon 202, supplied by British Geon, Ltd.) instead of the orthodox solid pellets or chips. The other unusual feature of this demonstration was the feeding of the powdered p.v.c. without a plasticizer, for whilst the addition of plasticizer provides flexibility for the extruded product it also decreases the chemical resistance of the piping.

Other old friends among makers of plastics machinery who were also at Castle Bromwich included Bradley and Turton, Ltd., T. H. and J. Daniels, Ltd., Finney Presses, Ltd., Foster, Yates and Thom, Ltd., and Alfred Herbert, Ltd., of whom we are reminded by accompanying illustrations of their respective exhibits. At Olympia, Manesty Machines, Ltd., had a display of machinery for preforming plastics moulding powder, including their R.S.2 rotary tablet machine; and at Earls Court (in the Plastics Section of the Fair) Radio Heaters, Ltd., exhibited a wide range of "Radyne" plastics welding machines, including their new P.W.10 welder (1 Kw output), which has an air compressor for pneumatic operation in place of pressure obtained by a foot pedal. This machine is also fitted with a fully automatic synchronous type process timer which can be set for welding times up to 10 seconds, depending on the work in hand.



The "Radyne" P.W.10 welder, a new machine by Radio Heaters, Ltd.

Moulded Dinghies Made with "Durestos"

THE Southampton Launch and Boat Co., Ltd., Bitterne Manor, Southampton, have over the past two years conducted research and experiments with an asbestos-based resin-impregnated felt ("Durestos," a product of Turner Bros. Asbestos Co., Ltd., Rochdale, Lancs), for the manufacture of 10-ft. sail and pulling dinghies.

The manufacturing methods employed are comparatively simple and entail the use of a mould, which is first waxed to prevent the cured shell from sticking, upon which strips of the resin-impregnated felt are laid and then tailored by hand until one skin is complete. A coat of resin Aerodux 185 (resorcinol-formaldehyde) is then spread over this skin, and a second layer of felt is put on in the same manner as the first.

The mould and the two skins are now placed in an oven and hardened for about 12 hours at about 100 degrees C., the time and degree of heat depending upon the thickness of shell to be cured. When removed from the oven the shell falls away from the mould quite easily and the heat treatment transforms the "Durestos" into a substance which is very tough and durable, and the two skins are permanently bonded together. A wooden stem, keel, hog, gunwale and thwarts are then fitted. Rubbing strakes, rowlocks, knees and floor slats complete the dinghy, except for a coat of paint.

The weight of the shell alone after curing is about 67 lb.; the total weight of the dinghy is about 112 lb. Once the mould has been made, it is found that female labour is quite adept in "tailoring" the felt.

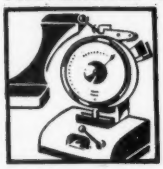
A 10-ft. dinghy made in this way, all mahogany parts varnished and the hull finished in cream enamel, has been used by the Ministry of Supply at their establishment at Christchurch for two and a half months without showing any sign of failure, nor appearing any worse for wear.

The "Durestos" felt is supplied in the form of large, soft sheets, approximately 100 ins. by 40 ins.; it is particularly suitable for low-temperature moulding and does not require pressure.

The Southampton Launch and Boat Co., Ltd., also manufacture buoyancy tanks and fuel containers in the same manner.

World's Industry Employs Plastics

MATERIALS and TESTING



Properties of polystyrene.—Measurements on unfractionated and fractionated polystyrenes supplied data on some fundamental properties: for a large class of mechanical properties the value of the property is zero at low molecular weights, increases with increasing molecular weight and ultimately approaches an asymptote. (Journ. Appl. Chemistry, 1951/Oct./456.)

Treatment of p.v.c. pastes.—G. Beck has carried out investigations on the capacity to gelatinize and the fluidity of a number of plasticizers. ("Kunststoffe," 1952/Feb./37.)

Stabilizers for polyvinyl chloride.—A. Rosenberg developed a simple testing method for evaluating the various stabilizers on the world market compared with the types available only in Germany. ("Kunststoffe," 1952/Feb./41.)

Fatigue tests with resin-bonded aluminium.—W. N. Findley and coll. report on results of fatigue tests of aluminium-alloy joints bonded with resinous adhesive. Single-lap, double-lap and bolt joints were tested in an axial-load fatigue machine. ("A.S.T.M. Bulletin," 1952/Jan./67.)

Compression testing of plastics.—A German draft Standard, DIN 53454, October, 1951, has been issued. It explains the purpose and use of the test and according to the material to be tested four different samples are prescribed: for moulding powders a cube of 10 mm. side, for sheet material a cube of the thickness of the sheet; for bar material a rod section and for tubes a tubular section; with laminated material five samples in each main direction are prescribed.

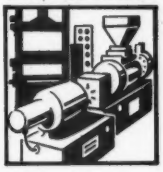
Tensile testing of plastics.—A German draft Standard, DIN 53455, October, 1951, has been issued. It explains purpose and use of the test and outlines two types of samples, a moulded one 200 mm. long, 40 mm. wide and 4 mm. thick, and a machined one cut from sheet or plate material 200 mm. long, 20 mm. wide and a thickness of 1 to 10 mm. according to the thickness of the sheet material.

Glass fibre reinforced plastic sheet, an intermediate grade between machining and electrical grade sheet and high-strength sheet, is claimed by the manufacturers, Dynakon Corp., 5509 Hough Ave., Cleveland 3, to have excellent properties for stressed applications in electrical, chemical and appliance field. ("Materials and Methods," 1952/Jan./119.)

Relationship between composition and behaviour of phenolic resins.—H. F. Mueller and I. Mueller report analytical investigations on the resin structure depending on the production conditions. Acid curing phenolic resins are used as an example to show how the composition influences the curing process and the quality of the product. ("Kunststoffe," 1952/Mar./57.)

Polyvinyl chloride.—D. S. Plumb and R. F. Hansen deal with the increasing importance of p.v.c. ("Chem. Engineering News," 1951/Vol. 29/5,432.)

PROCESSES : MACHINERY



Plastics moulding presses.—H. Draeger gives a survey of the various types of presses used for plastics such as moulding, injection and tablet presses. After describing the trend in mechanical and hydraulic presses future possibilities are indicated. This is followed by the description of outstanding presses based on information supplied by individual firms. ("Kunststoffe," Vol. 42, 1952/April/82.)

Injection - moulding machines.—H. Bock gives a survey of these machines, discussing problems of mass cylinders, closing pressure, movement of injecting piston, main drive and so on. This is followed by description of outstanding German designs, as supplied by the manufacturers. ("Kunststoffe," Vol. 42, 1952/April/90.)

Extrusion presses, with worm feed.—E. Escales discusses the development of these machines and compiles in a table the design data of the types made by German manufacturers. (A total of eight manufacturers produce 34 different machines.) ("Kunststoffe," Vol. 42, 1952/April/97.)

Dies for postforming thermosetting laminates.—In this 5th of a series of articles the actual process is described in detail. ("Machinery" (N.Y.), 1951/Dec./171.)

Grinding fixture for moulded bushing.—Grinding was found to be best for machining outside diameter and inside slot of bushing. R. W. Newton describes the special fixture developed. ("Machinery" (N.Y.), 1951/Dec./190.)

Design in phenolic plastics.—J. Downs deals with the basic rules to be followed in developing an efficient and satisfactory product: choice of material, problem of flash, moulding tolerances are discussed in this part. ("Toolmaker and Precision Engineer," 1952/Jan./18.)

Jointing techniques for "Perspex," using acrylic dough and a solvent cement have been evaluated by the Fairey Aviation Co. The shear, tension and bend strengths at ambient temperatures, +70 degrees C. and −70 degrees C. for plasticized and unplasticized "Perspex" were determined. Acrylic dough gives higher ultimate strengths. (Soct Memo. No. 5151, unclassified.)

Seam welding of thermoplastic foils.—E. Schenkengel reports on experiences with the seam welding machine of G. M. Pfaff A.G., Kaiserslautern. ("Kunststoffe," Vol. 42, 1952/March/26.)

Removing electric charges. — To prevent electric charges on plastics, such as "Perspex," B. H. Parks suggests a hydrophilic detergent. (Journ. Scientific Instruments, Vol. 29, 1952/April/133.)

Mould for car door arms.—G. H. De Groat describes a plastic mould in which the cores are operated by rack and pinion mechanisms. ("American Machinist," Vol. 96, 1952/April 28/97.)

Plastic equipment and technique.—A 16-page supplement on plastics moulding deals with the equipment necessary. ("American Machinist," Vol. 96, 1952/April 28/107.)

INDUSTRIAL APPLICATIONS

Melamine resin in paper technology.—Melamine resins, in addition to imparting special properties bring a slight improvement in the quality of cellulose and the stability of paper. Whether this affects the natural ageing has still to be determined. (Nat. Bur. Standards Technical News Bulletin, Vol. 36, 1952/April/58.)

Heat-treated polystyrene clip.—A new process has been developed for a strong clip to attach a plastics automobile thermometer to a ventilator wing. When part comes from mould it is subjected to heat to remove moulding strain. ("Materials and Methods," Vol. 35, 1952/March/101.)

Metal-sprayed plastic moulds.—G. B. Lewis and L. Frost describe a new technique of producing removable moulds by spraying copper and silver solders to phenolic, plaster and ceramic matrices. The former is preferable as it leads to surfaces free from porosity. ("Machinery" (N.Y.), 1951/Dec./152.)

Plastics bearings.—The difficult position on the metal market requires an economical use of non-ferrous metals. Survey of the properties of plastics bearings and applications in which they have been proved to be useful. ("VDI-Zeits," 1952/94m/138.)

Plastics-bonded Carpets

By GEORGE MAY

Plastics are already well represented in the textile industries by a variety of forms, including woven synthetic yarns, waterproof treatments for fabrics, mediums for surface coating and adhesives for laminating. The present article deals with new developments in plastics-bonded fibres.

AFTER the last war, a shortage of woven carpets encouraged the manufacture of substitutes made from felted waste fibres, bonded with plastics. Some of these products were exceptionally hard wearing and comparatively low in cost; others, of poor quality, served only to misrepresent the true value of plastics bonding, properly executed.

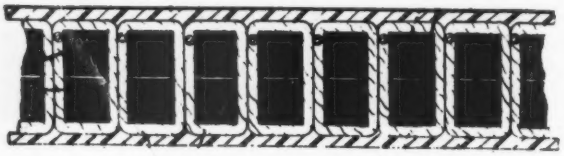
More recently, much consideration has been given by a number of manufacturers to the advantages of using synthetic materials as applied to the production of true pile carpets, particularly as the practical possibility of creating such a surface by imbedding fibres in a suitable medium, is already demonstrated in a limited way by flock spraying.

(A) Yarn-covered rods in contact with band spread with p.v.c. paste.

(B) Plastics bonding medium applied to top side of assembly.

(C) The introduction of spacing rods results in a more open pile.

(D) Underfelt laminated to back of carpet in process of manufacture.



(E) Method of assembly to provide two carpets when processed and divided.

Fig. 2.—Alternative methods of bonding spun fibres in order to produce pile carpeting.

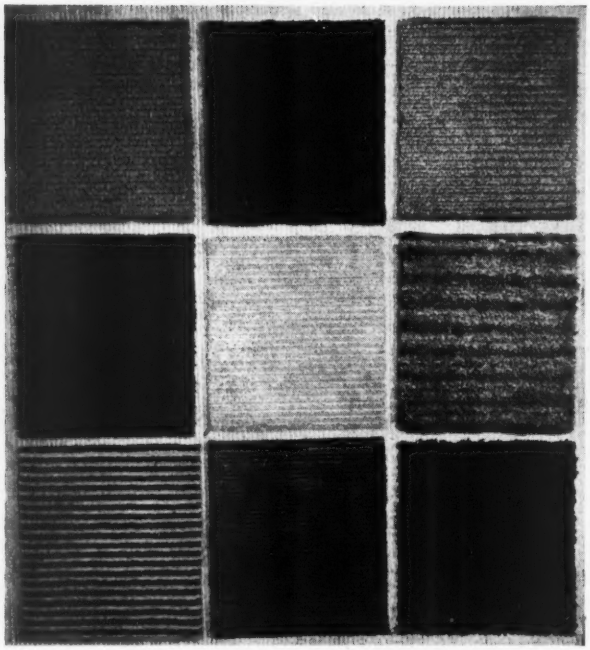


Fig. 1.—Plastics-bonded carpets may be made in a variety of textures and effects by using colour combinations of either natural or synthetic yarn wound on formers of differing section.

Many pleasing examples of experimental carpets have been made by combining chopped wool or other yarn with settable plastics compounds, so that a pile finish is obtained. In most cases, however, the methods used do not appear to offer a satisfactory and economical basis for scaling up from the 2 ft. to 3 ft. square of laboratory samples to the continuous production required for commercial development. The writer's approach to plastics in relation to carpet making, was to establish a simple basic principle by practical experiment, after a careful study of traditional methods under actual working conditions.

Original experiments in the application of plastics were made by employing a small loom, set up with a "warp" of two-ply wool. Instead of using a shuttle, as in true weaving, round metal rods, $\frac{1}{8}$-in. diameter, were fed in to replace the "weft" which normally would have been of yarn. As this combination left the loom, it was guided on to a travelling metal band receiving a coating of polyvinyl chloride in paste form. The weight of the rods was more than sufficient to imbed the wool in the plastic coating and hold it in position until it had passed through an infra-red oven and the p.v.c. had been cured. After completing the curing cycle, the rods were withdrawn and returned to the loom. The result was a looped pile of wool set in a film of plastics, with the alternative choice of a cut pile if desired.

At first glance, this plastics carpeting was most impressive and encouraging; but further consideration led to the opinion that the weight of bonding medium needed for a flawless backing was much greater and out of proportion to the weight of fibre used. Having both a high quality and economical end product in mind, it was decided to concentrate on an improved method by which the outstanding characteristics of both materials could be combined and applied in the best possible way.

A further range of practical experiments and examination of the results, showed that in bonding fibres to create a pile

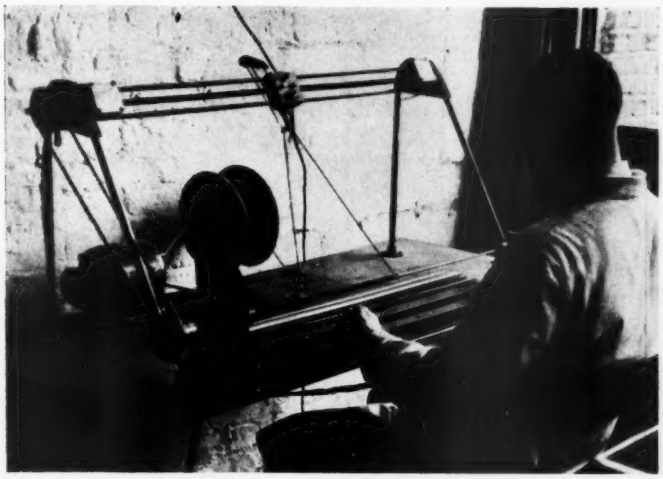


Fig. 3.—The development of the winding mechanism. This machine produces consistent results, is unaffected by knotted joins in yarn, and cuts out automatically when rods are covered.

surface, the process of spinning had very considerable advantages over that of weaving. This was impressive enough to influence a decision to abandon further experimental work with the loom, thus allowing undivided attention to the more favoured spinning method.

The latter system, attractive in its simplicity, consists basically in spiralling a single layer of selected yarn over rods of suitable section. Rods wound in this way are held together, parallel to and in close contact with each other, until a suitable adhesive compound, applied to one fibrous surface, has set. Afterwards, the yarn is cut to release the rods, and in this way a pile carpet is formed. It is essential that the formers should be either of "U" section, or slotted to provide an accurate guide for cutting knives.

Brass rods are very convenient to use. Experimental samples were made using formers of up to 6 ft. in length, and varying widely to include solid, tubular, square, angle, channel and "T" sections of differing sizes. Square and rectangular sections have been found to be the more practical in service.

One method of producing a bonded carpet is to apply mechanically-wound wool-covered rods transversely and continuously on to the endless moving band of a suitable casting machine, after a layer of paste has been deposited, so that the wool on the underside of the rods becomes

Fig. 4.—Oven being filled with formed rugs, which undergo a 15-minute curing cycle after having been coated with "Welvic" p.v.c. paste.

embedded in this medium. Plasticized polyvinyl chloride paste is a suitable material for the purpose, as, after heating for a given period, it changes to a flexible, rubber-like consistency, thus bonding the wool-covered formers firmly together. As soon as their purpose has been served, the rods are removed and immediately returned to the winder, in order that the minimum number only need be employed.

Another method of carrying out the process is by accumulating yarn-covered rods in a convenient framework of predetermined dimensions, and applying the bonding medium to the top surface of the assembly. This coating may be allowed to air dry, or, according to its nature, setting can be accelerated by heating, with or without the application of pressure. In the latter instance, a veneer press is particularly well suited and when pressure is applied, the quantity of bonding material is greatly reduced and therefore more efficiently used.

In order to effect economies of surface material by producing a more open pile, the covered rods may be separated by introducing uncovered rods as spacers. Such spacers require to be equivalent in height, to the overall height of the covered rods.

Fig. 5.—"Non-slip" plastics rugs, 30 in. by 60 in., made specially for hospital requirements.

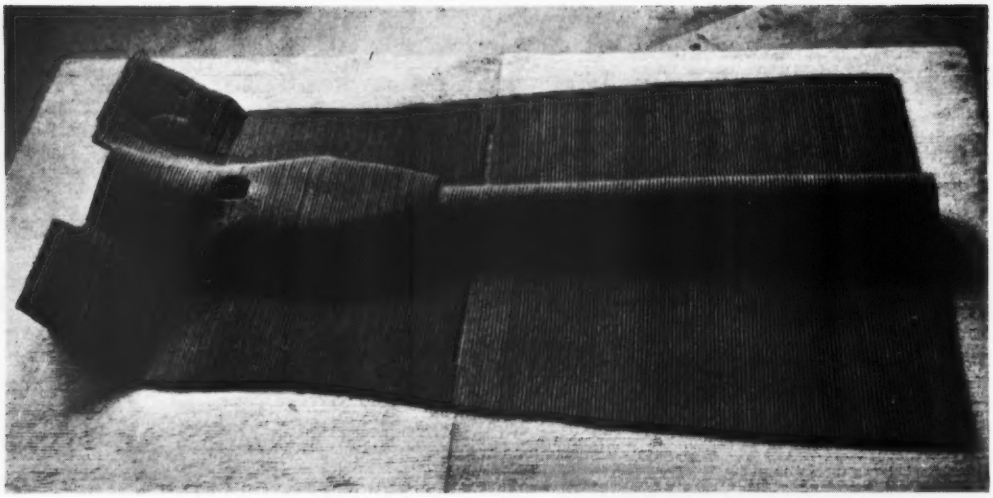


Fig. 6.—Cut and heat-welded to shape, car carpets made with plastics do not fray and require no binding.

If, before application of the bonding medium, the wool is carded or teaseled in one direction, at right angles to the rods, an excellent fibrous reinforcement to the plastics backing covering the spacers is provided. This operation strengthens the final carpet or rug considerably.

In a further processing application, it is also possible to coat the yarn-covered rod assembly on both faces; in this way, after the bonding agent has set, two carpets are formed in one operation by equally dividing the wool between the layers. When this is done, specially designed rods, or rods wound in pairs, provide a means of guiding the cutter.

When carpets are being laid, an underlayer of paper or felt is usually recommended in order to prolong their life. With the plastics-bonded product this underlayer may be incorporated in course of manufacture, as the laminating operation requires no adhesive agent other than that already contained in the bonding medium. Felts and other materials, such as webbing of carded and calendered synthetic fibres, are suitable for this type of laminate.

Table 1.

Grade, or details of forming	Surface yarn: Weight per sq. ft.	Backing Material: Weight per sq. ft.	Total Weight per sq. ft.	Total Weight per sq. yd.
WOVEN CARPET				
1	5 oz. wool	1 oz. jute	6 oz.	3 lb. 6 oz
4	4 oz. wool	1 oz. jute	5 oz.	2 lb. 13 oz.
4a	3 oz. wool	1 oz. jute	4 oz.	2 lb. 4 oz.
SPUN CARPET—BONDED WITH PLASTICS				
3/16 in. Square rods ..	5.3 oz. 6-ply wool	4 oz. p.v.c.	9.3 oz.	5 lb. 4 oz.
As above	2.6 oz. 2-ply wool	4 oz. p.v.c.	6.6 oz.	3 lb. 11 oz.
As above, with 1/8 in. spacers	2 oz. 2-ply wool	4 oz. p.v.c.	6 oz.	3 lb. 6 oz.
1/8 in. Square rods ..	1.6 oz. 2-ply wool	3.2 oz. p.v.c.	4.8 oz.	2 lb. 11 oz.
As above, under pressure	1.6 oz. 2-ply wool	2 oz. p.v.c.	3.6 oz.	2 lb.
7/32 in. Square rods ..	4 oz. 2-ply wool	3 oz. p.v.c.	7 oz.	3 lb. 15 oz.
As above, with 1/8 in. spacers	3 oz. 2-ply wool	7 oz. p.v.c.	10 oz.	5 lb. 10 oz.
As above, with wool teaseled..	3 oz. 2-ply wool	6 oz. p.v.c.	9 oz.	5 lb. 1 oz.
7/32 in. Square rods, with spaced winding ..	2 oz. 2-ply wool	3 oz. p.v.c.	5 oz.	2 lb. 13 oz.
7/32 in. Square rods ..	3.5 oz. synthetic yarn	3 oz. p.v.c.	6.5 oz.	3 lb. 10½ oz.
As above	3.5 oz. synthetic yarn	2 oz. p.v.c.	5.5 oz.	3 lb. 1½ oz.
As above	5 oz. fine rayon	3 oz. p.v.c.	8 oz.	4 lb. 8 oz.
As above	4.5 oz. synthetic yarn	3 oz. p.v.c.	7.5 oz.	4 lb. 3½ oz.
"T" Section rods, base 1/2 in., height 11/32 in.	4 oz. 2-ply wool	3 oz. p.v.c.	7 oz.	3 lb. 15 oz.
Rectangular rods 7/16 in. × 7/32 in.	3 oz. 2-ply wool	3 oz. p.v.c.	6 oz.	3 lb. 6 oz.
As above	4 oz. 3-ply hemp	3 oz. p.v.c.	7 oz.	3 lb. 15 oz.
Rectangular rods 21/32 in. × 7/32 in.	2.5 oz. 2-ply wool	2.5 oz. p.v.c.	5 oz.	2 lb. 13 oz.
Rectangular rods 7/8 in. × 7/32 in.	2.25 oz. 2-ply wool	2 oz. p.v.c.	4.25 oz.	2 lb. 6½ oz.
3/8 in. Square rods ..	2 oz. 2-ply wool	2.5 oz. p.v.c.	4.5 oz.	2 lb. 8½ oz.

Fig. 7.—The floor of a Ford "Prefect," covered with plastics carpeting. With such material, a luxury finish may be provided at less overall cost, as compared with the elaborate tailoring required to manipulate lower-grade products. No underfelt or mechanical fasteners are needed.

To obtain information concerned with modified effects made possible by variations in formers, yarn and backing, the next series of experimental samples, each 1 ft. square, were made for comparison with traditional carpeting. The results are recorded in Table 1.

It was noted that all the specimens as listed in Table 1 were excellent, both in quality and mechanical strength, and the factual data enabled selections to be made for larger scale development.

There are varieties of synthetic media available, both in the air drying and heat setting types, that are suitable for bonding fibres together; but experience has shown a preference for p.v.c., which appears likely to be considered the most

convenient material for general purposes in carpet manufacture. Experiments were also made in hot-pressing various thermoplastic films into the fibrous surfaces formed by assemblies of yarn covered rods, but with less success than in applying plastics in the form of paste, emulsion or solution.

The writer has taken particular care to design a system in which both fibres and bonding medium contribute desirable characteristics to each other in their combined effect. For example, not only does the p.v.c. prove efficient in uniting the spiralled yarn, but the fibres, being in a continuous web on the coated side, provide a strong reinforcement which stabilizes the flexible plastics backing.

After establishing a satisfactory and reliable basic principle, more extensive work was carried out by arrangement with V. G. (London), Ltd.; first at Twickenham, and later at their Kilburn factory. The programme included erection of pilot plants to accommodate carpeting in both 30-in. and 40-in. widths, and these were linked with ovens of the convection, gas and electric infra-red types, in order to determine the curing system best suited to the process.

The first aim was to produce a sufficient quantity of material for practical tests. This was accomplished in a comparatively short time and the output took the form of continuous carpet, rugs 30 ins. by 60 ins., and smaller mats in a variety of sizes, the selected texture being made by using 7/32-in. square brass rods as formers.

One outstanding advantage of the plastics-bonded product over the commercially woven carpet is that the surface pile is really secure and cannot be dislodged from the backing. This is also closely associated with the subsidiary feature of strong adhesion providing complete freedom from fraying after cutting, and therefore eliminating the binding operation necessary in the case of the mechanically interwoven product.

The speed with which a plastics fitted carpet can be laid is surprising. It is " non-curling," lays flat without becoming displaced, is quickly cut to shape with a straight edge and knife, or scissors, and the sections require neither sewing together nor edge taping and binding.

Another notable feature of the p.v.c. backing on rugs is its " non-slip " properties, and already this safety factor has been enthusiastically appreciated in hospitals. Tests made on various surfaces, including highly polished parquet flooring, have provided equally agreeable results. The plastics backing is also completely mothproof and trial production runs of carpeting have now been applied to floor surfaces in practically every way, being laid in strips of machine width, heat-welded into larger sections or applied as stair runners, rugs and mats.

Further exaggerated tests under conditions of abnormal wear proved the bonded carpet to be an extremely robust product, and results from the practical demonstrations were confirmed by an independent and most satisfactory report, after testing specimens mechanically on a Martindale wear test machine.

A more detailed examination of the new material's properties revealed that the non-porous, draught-excluding backing was resistant to ingrained dirt, and also allowed suction cleaners to operate at their maximum efficiency. Repairs to accidental damage, as by burning coals, can be neatly executed by cutting out the damaged part and replacing with a patch which may be fixed either with adhesive solution and an overlapping fabric backing or heat sealed.

Plastics carpeting is extremely versatile in application and can be readily manipulated to overcome obstacles such as gearbox casing, which is to be found in the flooring of motor-cars. There are two approaches to the formation of such a covering. The first is to cut planned sections and heat weld these to shape. Secondly, it has been demonstrated experimentally, that by using a specially designed, thermoplastic backing compound, moulded car carpets can be produced by heating and application of the well-known blowing, vacuum or liquid pressure techniques. In both cases the effect obtained is that of a luxury product as compared to the lower grade carpeting normally used. Further, as some jacking systems are accessible from inside the car by lifting the carpet, it is therefore an advantage that this should lay in its true position without the aid of studs and fasteners.

Although it cannot be foreseen that variety of designs in spun carpeting could equal the unlimited number of elaborate patterns obtained by using the Jacquard apparatus to regulate weaving, the decorative effects obtained are colourful, pleasing in their simplicity, and well suited to the modern trend in art. One particular feature, which is most noticeable, is the exceptionally resilient and silent tread. The combination of plastics and spun fibres is fundamentally sound and produces not a substitute, but an entirely new and improved type of carpet with individual characteristics of its own, including a very substantial, self-supporting velvet pile.

In assessing the future of plastics carpets, one outstanding advantage over traditional methods is the low capital expenditure and reduced factory space needed for installation of plant.

Apart from car carpets, other floor coverings requiring the possession of special qualities, include ultra lightweight carpets for aircraft, pest resistant products for tropical use, and rugs for boats and yachts. For instance, the latter require to be unaffected by sea water, should not felt after continuous soaking and drying, and be proof against anything in the nature of mildew, if stored in humid conditions.

Patent rights covering methods of manufacturing " Plasti-carpets " have been assigned to V.G. (London), Ltd., 9, Newman Street, London, W.1.

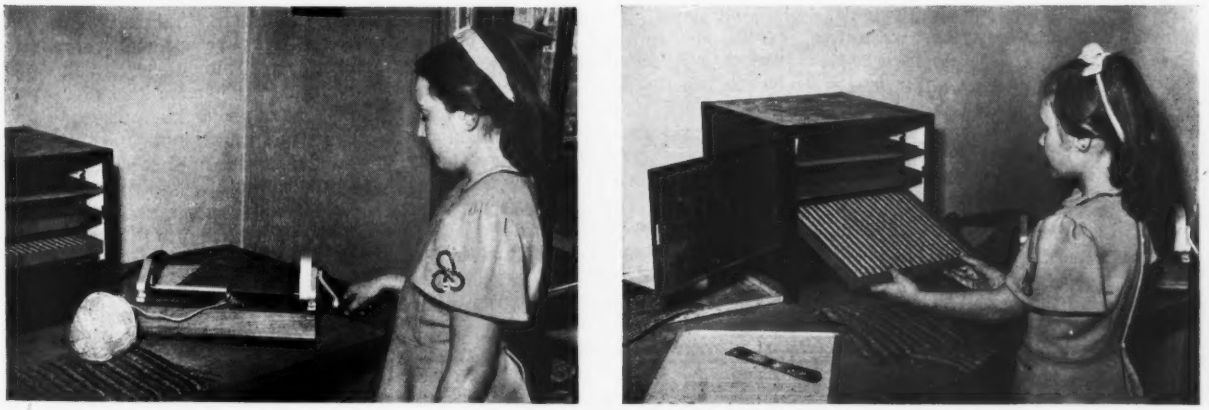


Fig. 8.—The author's experimental apparatus demonstrates simplicity of method in bonding yarn, wound spiralled on metal rods, with plasticized polyvinyl chloride to produce carpeting.

Methods of Manufacturing Reinforced Plastics in the U.S.A.

By C. E. BACON, B.Sc., S.P.E., A.C.S.*

We have pleasure in publishing the following abstract from one of the papers read before the Glass Fibre Reinforced Plastics Convention at the meeting held at Ashorne Hill, Leamington Spa, on 12th May. Owing to lack of space in this issue we are holding over until the July issue of this journal abstracts from some of the papers read; by Dr. V. E. Yarsley, on "Some Chemical Aspects of Contact Resins"; by H. Cole, M.A., F.R.I.C., on "Relations between the Composition, Structure and Physical Properties of Glass"; by A. M. Dobson, B.Sc., A.Inst.P., on "Glass Fibre Reinforcements for Plastic Laminates"; by H. Warburton Hall, M.Sc., and G. A. Collie, B.Sc. on "Some Applications and Problems of Glass Fibre Laminates for Service use"; by K. Hyde, B.Sc., on "Glass Fibre Laminates for Electrical Use" and a second paper by C. E. Bacon on "Applications for Glass/Resin Laminates in the U.S.A."

FIBROUS glass for the reinforcement of plastics in the U.S.A. is supplied in the following forms: (1) Reinforcing cloth, (2) reinforcing yarns, (3) reinforcing mats, (4) reinforcing roving, (5) milled fibres, (6) reinforcing strands, (7) surfacing mat.

The first six of the above reinforcing materials are made from the basic textile strand. The fabrics, of course, are woven from the basic textile strand on conventional textile equipment. The reinforcing roving is a 35-40-lb. ball of, usually, 60 ends of the basic strand. The reinforcing strands are prepared by chopping the reinforcing yarns to a definite length, usually 2 ins. Reinforcing mats are manufactured by a random orientation of cut strands bonded with a powdered or liquid binder. Milled fibres are manufactured by hammer-milling the textile strands into very short, individual filaments, varying from 1/32 in. to lengths approximately ¼ in. Surfacing mat is a filament-type random-distribution mat, usually used to produce a smooth surface on a moulding. In the subsequent discussion of manufacturing methods, reference will be made to point out in which process each of these products is used.

In the early days of reinforced plastics in the U.S.A. many so-called crude processes were used as a method of manufacture. We should not discount these methods too much, because an industry has evolved from what was learned in that era. Development engineers, along with production men, have taken full advantage of the manufacturing possibilities of these newer materials and adapted them to relatively rapid production processes.

The vacuum, or pressure-bag technique, which involves the use of a rubber diaphragm, has been used mostly on large area parts and in short production runs. From this start, the development progressed, using the rubber-plunger process, mated wood or plaster moulds, and finally to-day mouldings are manufactured in production quantities with matched metal moulds. This process gives us moulded parts with consistent dimensions, surface appearance, and a minimum cure cycle. The proper design of the mould also produces a trimmed part which requires little, if any, finishing time.

Another method of manufacturing is what is known as the "Marco" process, used mostly in large area parts, such as boats. Here the reinforcement is placed into the mould, usually on the male, and the moulds are clamped securely together. Resin is then drawn by vacuum up through the reinforcement until complete saturation is achieved, with air excluded. After a short time, predetermined by the catalyst system employed, the resin gels. In this case, the heat generated by the exothermic reaction assists in the curing of the resin.

Progressive lamination is accomplished by applying catalysed resin to the reinforcement as it is draped on a mould or form. The resin is usually worked into the reinforcement with a spatula or trowel. Here, again, the catalyst system must be so formulated that sufficient time is allowed for the lay-up prior to gelation. As the operator impregnates new areas, gelation occurs in what he has already laid up and when he has progressed around the moulding a complete part is cured to a strong gel. Usually, after-baking is necessary here, in order to make sure that the resin has reached a complete cure.

Continuous lamination is achieved by pulling an impregnated sheet of cloth or mat through an oven, usually with a top and bottom sheet of separating transparent cellulose film. The fabric is held flat by clamps which grip the film on each side at close intervals. A very smooth surface is possible in continuous lamination, since the cellulose film is in contact with the material as it cures.

Many other methods of manufacture, such as centrifugal casting, "Cellophane" wrap and continuous rod extrusion, are used for pipe and rod stock.

One of the major developments in reinforced plastics is what is known as the "preform" process. A roving package is usually employed, which feeds glass to a cutter, which, in turn, cuts the fibre to a predetermined length (usually 2 ins.) and then deposits the fibre upon a porous screen, which is the shape of the part to be moulded. As the fibres fall on the screen, a resin is applied which is later cured by placing the preform in an oven and pulling hot air through it. This process produces a preform which is well bonded and can be easily handled. From this point the preform is placed into the mould, the resin is applied, usually by pouring a charged amount into the mould. Slow closure of the mould allows the resin to flow and penetrate the entire preform before gelation occurs. A finished moulded part results. The preform process is being used almost universally, together with what we call the "matched metal mould" system. Here, mated moulds made of kirksite, fine-grain cast iron (meehanite), or steel, are so designed that when they close a shear ring pinches off the excess material along the trim line of the part. The industry as a whole is using this moulding method more and more. Parts being made by this method weigh up to 15 lb. each with areas as large as 24 sq. ft.

The incorporation of cut strands, usually ¼ in. in length, into a mixture of polyester resin and filler, produces moulding materials which are quite versatile. Strengths obtained with this type of moulding material are usually about two-thirds of what is possible with mat or preform moulding. The techniques employed in the fabrication of this material are conventional compression and transfer mould, with only slight modifications. We feel that this particular phase of the industry is ready for a tremendous growth in the next year or so.

In the growth of this industry, people with ingenuity have not only developed new moulding methods, but also have done a remarkable job in adapting these reinforcements and resins for processing by conventional moulding equipment. From what we have seen of some exploratory work, the time is not too far distant when many large injection-moulded parts, perhaps with polystyrene, will be reinforced with fibrous glass, opening up new markets for this type of material heretofore impossible.

* Owens-Corning Fiberglas Corporation.

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes

Desoutter plastics moulding adaptor.

ADAPTOR.—The plastics moulding adaptor illustrated (Desoutter Bros., Ltd.) offers a quick and efficient method for unscrewing mouldings from a moulding press. These adaptors are lined with a thickness of rubber which enables them to grip the mouldings firmly without scratching or damaging them. They may also be used with considerable effect for screwing caps on, ready for packing. They are available in sizes from $\frac{7}{8}$ in. to $1\frac{1}{2}$ ins. (in variations of $\frac{1}{4}$ in.), and $1\frac{1}{2}$-in. and 2-in. diameter. The Desoutter R.23 and R.24 slow speed reverse screw guns have a special attachment for these adaptors.

PROCESS TIMER.—Type ASR process timer, by Londex, Ltd., 207, Anerley Road, London, S.E.20, is self-resetting and suitable for remote automatic control. This timer comprises a continuously running motor coupled, during timed periods to a timing and contact-operating mechanism, by a friction clutch. Time ranges from 60 seconds to 72 hours are obtainable, and the pointer can be normally set for any time within this range. During the timed period the pointer travels back to zero, thus always indicating the time yet to elapse; at the end of the timed period it returns automatically to the pre-set position. The contact-operating mechanism is able to take up the drive without any loss of time. The design of the instrument allows for a wide variety of switching arrangement; for instance, the mains contact can open during or after the timed period, and the warning contact can operate just before the end of the pre-set time.

Londex ASR process timer.

MOBILE LOADING PLATFORM.—To facilitate the loading and unloading of railway goods wagons directly from and to road vehicles by power pallet trucks, Lansing Bagnall, Ltd., of Basingstoke, have developed a new type of mobile loading platform. This consists of a four-wheel trailer with two platforms of adjustable height, hinged at an intermediate point, which can be raised or lowered by means of a convenient crank handle operating mechanical screw jacks, and a linkage system. At the rail wagon end the platform remains in a horizontal position at all times and has a vertical movement of 3 ft. $9\frac{1}{2}$ ins. to 5 ft. $3\frac{1}{2}$ ins. above ground level, with an area of 6 ft. by 6 ft. The road vehicle end has a vertical movement of 3 ft. to 4 ft. and forms a sloping platform 10 ft. by 6 ft., which allows it to be used as a ramp. Hinged flaps, three at the wagon end and one at the road lorry end, are also provided and act as bridge plates when the platform is in use. In operation, the platform is positioned alongside a railway wagon so that the horizontal platform end is in line with the wagon doorway; it is then adjusted for height and the hinged flap dropped to form a bridge plate, after which the parking brake is applied. The two remaining flaps are left in the vertical position and act as a safety wall round the other two sides. The road vehicle to be loaded or unloaded is then backed up to the ramp end and the height of the platform adjusted accordingly, while another hinged flap forms a further bridge plate.

This mobile loading platform (Lansing Bagnall, Ltd.), greatly facilitates the loading and unloading of goods wagons, etc.

INSTITUTE OF MATERIAL HANDLING.—There have been several attempts since the end of the war to form an institute or association covering the subject of material handling. Hitherto such efforts have not met with success, and several other institutions of long standing have appointed committees to study the question, which was brought into prominence by the success of the First Mechanical Handling Exhibition and Convention, at Olympia, 1948. At a meeting held recently at St. Ermin's Hotel, London, S.W.1, to again consider the proposal, there were present about 70 people representing users of equipment and manufacturers of mechanical handling equipment, and a vote taken on the formation of an Institute of Material Handling was carried unanimously. Any persons or firms interested can obtain further information from Mr. M. W. Paynter, secretary, Institute of Material Handling, 20-21, Took's Court, Cursitor Street, London, E.C.1.

INDUSTRIAL INFORMATION.—The American Library, at 41, Grosvenor Square, London, W.1, has recently opened an industrial section, which includes American books, periodicals, official documents, and other literature in the fields of technology, engineering, management, trade and agriculture. Books and other material can be borrowed by anyone in Great Britain and, where necessary, will be sent by post. In cases where a book or periodical is not available for loan, photostatic copies of special articles will be provided free of charge.

The Library is open to the public, Monday to Friday, 9 a.m. to 6 p.m. All service is free and inquiries are welcomed. Communications should be addressed to: Industry Section, American Library, 41, Grosvenor Square, London, W.1. Inquiries will also be answered by telephone: Grosvenor 9000, ext. 747 or 748.

VINYL RESINS IN CANADA.—Canadian Resins and Chemicals, Ltd., owned jointly by Shawinigan Chemicals and Carbide and Carbon Chemicals, are to build a $2\frac{1}{2}$ million dollar addition to its plant at Shawinigan Falls, Que. The new unit, to be completed in 1953, will produce vinyl chloride dispersion resins (organosols and plastisols), and foams. The compounded plastisols can be handled by spreading, extruding, dipping, or slush moulding. They are converted almost instantaneously to an elastomer by heating to about 350 degrees F.

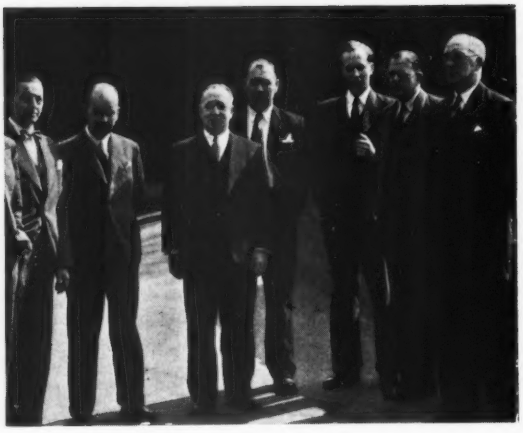
TRANSPARENT CELLULOSE FILM. Manufacturers of transparent cellulose film have ended the voluntary agreement with the Board of Trade, in force since June, 1951, under which film could not be supplied for wrapping many articles sold in the United Kingdom. The "Non-Permitted List," which gave details of the products affected, has been withdrawn and cellulose film can now be ordered for any purpose.

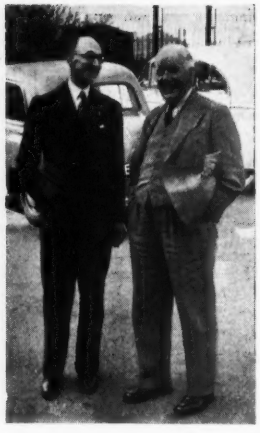
TELEGRAPH CONSTRUCTION AND MAINTENANCE CO., LTD., Greenwich, announces the formation of a Plastics Division to deal with expanding business in that field. The new Division will be under the managership of Mr. H. F. Wilson, formerly technical manager of the company. Mr. P. W. J. Ayerst will be the divisional sales manager.

PUNFIELD AND BARSTOW (MOULDINGS), LTD., inform us that Mr. Sidney Thompson has been appointed a director of the company.

MR. R. KRIS, formerly managing director of Welwyn Plastics, Ltd., has joined East Anglia Plastics, Ltd., as general manager. Among other things, Mr. Kris will be responsible for the introduction and development of p.v.c. and allied compounds.

SCOTT, BADER AND CO., LTD., announce that pending the appointment of a sales director they have appointed Mr. W. F. Hicks, who has been their Southern Region technical representative for many years, as temporary sales manager at their London Office, 109, Kingsway, W.C.2.





Members of the Works Managers' Discussion Group of the British Plastics Federation Moulders' Group photographed during their visit to Birkbys Ltd. are (left to right) L. H. Hayward, E. G. Burton (Kent Mouldings), S. Freeman (John Freeman and Co., Ltd.), L. G. Chaffey (Insulators, Ltd.), B. E. Terry, G. O. Collier (E. K. Cole, Ltd.), W. Charles Waghorne (Insulators, Ltd.). The picture on the right shows Dr. W. E. de B. Diamond, Director of the Federation, with Mr. F. E. Birkby, Chairman and Managing Director, Birkbys, Ltd.

LITHOLITE INSULATORS AND ST. ALBANS MOULDING, LTD.—At an informal gathering on April 18, presentations of certificates and cheques were made to 19 employees who had completed 25 years' service with the company. This business was founded in 1901, and originally made mouldings in bituminous composition material. The company now produces a wide range of plastic mouldings, and as its name suggests it has special connections with the electrical industry. The original premises were in Hackney, London, but removed in 1934 to Watford, Herts.

LETTERS TO THE EDITOR

Circuit Diagrams

SIR,—We refer to the inquiry ("Plastics," April, 1952, page 95) for information on the correct methods of laminating circuit diagrams between sheets of cellulose acetate.

While there are probably several methods which can be used, the following one has been seen working quite well in the United States, and we have supplied plant for similar purposes in this country, although the actual working out of the technique is obviously the customer's responsibility.

The size of diagram is not mentioned, but an ordinary 3¼-in. by 2¼-in. photograph requires three to five tons squeeze.

The apparatus to use in conjunction with the press consists of a tray with a hinged cover, and having a snap fastener, the inside surfaces of the sheets from which the tray is made being highly polished. Also required is a piece of coarse weave cloth resembling the material from which tents are made (cotton duct).

The press should preferably be one of two or more daylights, there being an equal number of hot platens working at about 150 degrees C. and a similar number of cold platens arranged as a multi-daylight press. The trays are opened and the piece of fabric material is placed on the bottom of the tray. A sheet of acetate which has previously been perforated with a large number of holes is placed on the fabric. The photograph is next put in position face upwards and this is covered with another sheet of acetate similarly perforated. The lid is then closed down and snapped tight.

This pack is placed in the hot daylight and the press is closed gently under pressure. After a few minutes the acetate sheets will plasticize, and trapped air will find its way out through the perforations. These perforations seal themselves under pressure and heat, and at the required time the whole pack is removed from the hot daylight, placed in between cold platens and the press is finally opened, the tray itself opened and the pack taken out. The cloth has to be stripped from the back of the completed moulding.

The advantage of a multi-daylight press is that two or three trays can be heating in the hot daylights while a similar number are cooled off in the cold daylights, but it is important that a rigid time cycle should be adhere to, otherwise the sheets tend to plasticize to too great an extent.

A very simple way of perforating the acetate sheet is to have a spiked wheel about 1-in. diameter on the end of a short handle, and rubbing this firmly over the acetate sheet on a wooden board so that the spikes stick through the sheet. This may sound very primitive, but it works exceedingly well.

The grade of acetate sheet seems to have quite an important bearing on the process; those the writer saw being processed in the United States were of excellent colour when completed, whereas some of those made up in this country tended to have a yellowish tinge.

It should be also pointed out that the acetate sheets should be somewhat larger than the photograph being mounted, so that sheets have an opportunity of sealing together outside this area.

T. H. AND J. DANIELS, LTD.
Lightpill Iron Works,
Stroud, Glos.

Dipping Formers

Sir,—We shall be glad to have addresses of English firms making "porcelain formers," as used in the production of dip-coated p.v.c. gloves.

A/S ARBEIDSHANSKER.
Fosswinckelsgt 1a,
Bergen, Norway.

[EDITOR'S NOTE: We suggest writing to the British Potter Manufacturers' Federation, Federation House, Stoke-on-Trent, Staffordshire, England.]

Granulating Machines

SIR,—We should be obliged if you could give us addresses of manufacturers of machines to granulate scraps of plastic.

SIEGRIST-OREL, LTD.
39 Berners, Street, W.1.

Machines for the Industry

The "Bipel" Horizontal Pelleter*

This entirely novel type of pelleting machine applies a controlled pressure for a predetermined time and therefore produces pellets which are uniform in size, weight and density. It will produce standard pellets of large size, 2 ins. and upwards. The makers of the machine are B.I.P. Engineering Ltd., Aldridge Road, Streetly, Sutton Coldfield, Birmingham.

THE compressing of powders into tablets or pellets is a common operation in the chemical and drug trades. When the need arose for pellets in the compression moulding industry, it was natural for moulders to use the machinery that had been developed for the older industries.

Pellets have many obvious advantages for the thermosetting moulder. First and foremost, they give a measured quantity of the substance in a compact form which can be easily handled. Secondly, they can be heated in an H.F. preheater with far greater ease than a powder, and almost all H.F. preheating is done on pellets. Thirdly, the compacting of the material excludes the air present in the loose powder and usually gives a better moulding.

The engineering industry has developed two basic machines for the drug trade, the fast-acting rotary for small pellets and the single-action machine for large pellets. The rotary machine can only justify its cost where very large quantities of a certain pellet size are required. Not only the initial cost of the machine is involved, but also the cost of the large number of punches and dies, and the cost of changing-over the machine, should a different size of pellet be required.

For this latter reason the single-acting machine is often used for small pellets where the number involved is not large.

Most of these machines have two common features: (1) The pressure is applied mechanically in the form of a blow. (2) The powder metering is by the gravity filling of a volume open at the top, followed by a "scrape off" of the surplus powder.

In all the mechanical machines, the closest approach of the top and bottom punches, i.e., the minimum distance between them in the die, is practically constant, varying only with strain in the machine. This means that if the weight of powder taken by the machine—as indicated in (2)—is slightly above the mean, the density will be higher and the pellet hard, whereas, if the weight is low the density will be low, and the resulting pellet will crumble on ejection. The weight may vary for a number of reasons. Large grains in the powder may cause the "scrape off" to leave an uneven surface, and proportion of fine to coarse material may vary from time to time.

The actual pressure applied to the powder must always be an unknown factor in such machines, and the best the operator can do is to judge the pellet for hardness, and adjust the machine.

The worst that can occur with single-action mechanical pelleters is that the mechanism becomes grossly overloaded

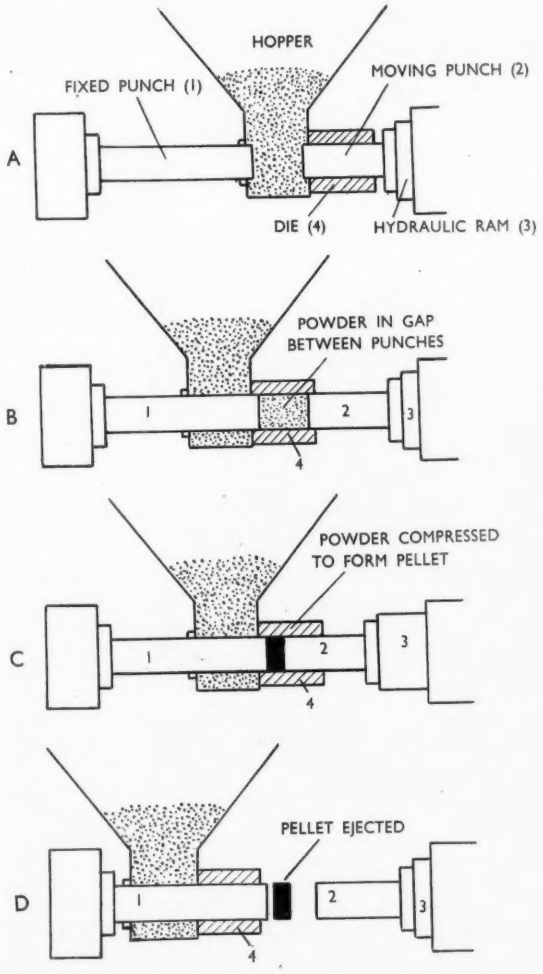


Fig. 1 (left)—Principle of operation for "Bipel" horizontal pelleter. The four movements are described on page 184.

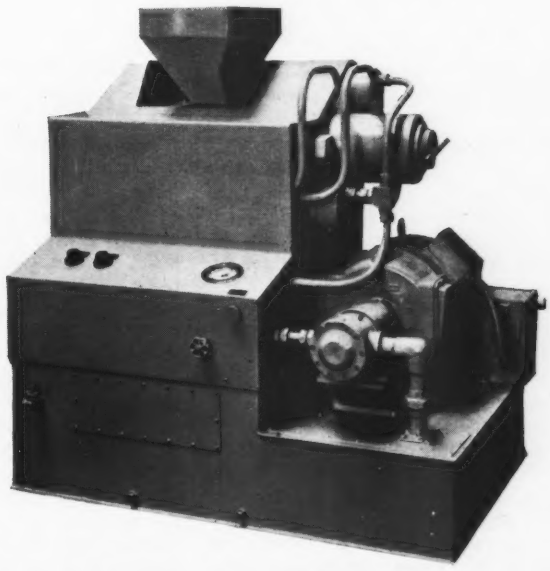


Fig. 2.—General view of "Bipel" horizontal pelleter.

* Patent protection pending.

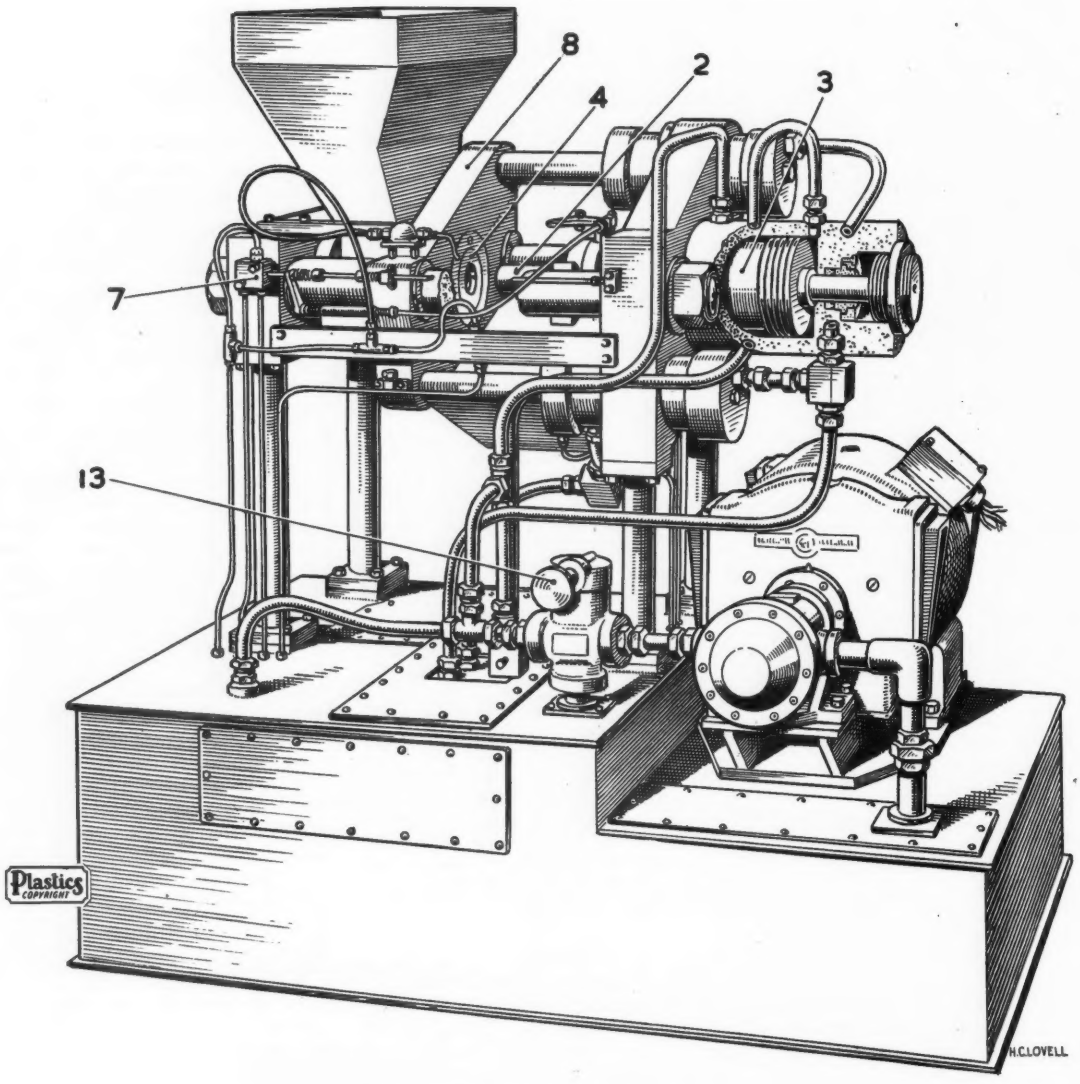


Fig. 3.—The "Bipel" horizontal pelleter.
2.—Moving punch. 3.—Hydraulic ram. 4.—Die. 7.—Traversing pilot valve. 8.—Die plate. 13.—Relief valve.

and the machine is smashed, involving delay and a costly repair. This can happen quite frequently with machines having no overload device, usually by a pellet already made bouncing back and being pelleted with the next charge of powder.

Rotary machines, owing to the different method of filling the die cavity and ejecting the pellet, are not so liable to double loading, but have other troubles that may lead to costly repairs. Such machines usually make very small pellets and the small-diameter punch is more easily strained and broken by the operator applying too much load. The broken punch, left in the cavity as a projecting peg, sweeps all before it, smashing the filling mechanism completely.

Another common trouble with single-action machines arises from the second feature listed above. In order to fill the cavity a "shoe" connected to the hopper is moved over the cavity ejecting the pellet just made as the movement takes place. If the machine is to work fast this movement must be rapid and the action is always by means of a cam. This sudden jerky action sooner or later breaks a pin or connecting rod in the linkage, and leaves the shoe in the daylight of the pelleter to be sheared and incorporated in the next pellet.

There can be no doubt that the ideal pelleter must have a cushion to relieve the machine of breaking loads when overloading occurs. This can be incorporated in a correct design, and may be either hydraulic, pneumatic, or a combination of the two. Mechanical overload schemes are not usually so good owing to inertia effects, but there are designs on the market incorporating them.

The great advantage of the fluid cushion is that the exact load can be made obvious to the operator on a dial gauge.

Where speed in making small pellets is concerned, the advantage of the rotary machine is so great that it is unlikely to be superseded by a basically different type. When such a machine is correctly designed and combined with a pneumatic or hydraulic cushion it becomes almost trouble-free. Very high rates are possible, and the longer and more constant pressure on the material makes good pellets possible from comparatively poor

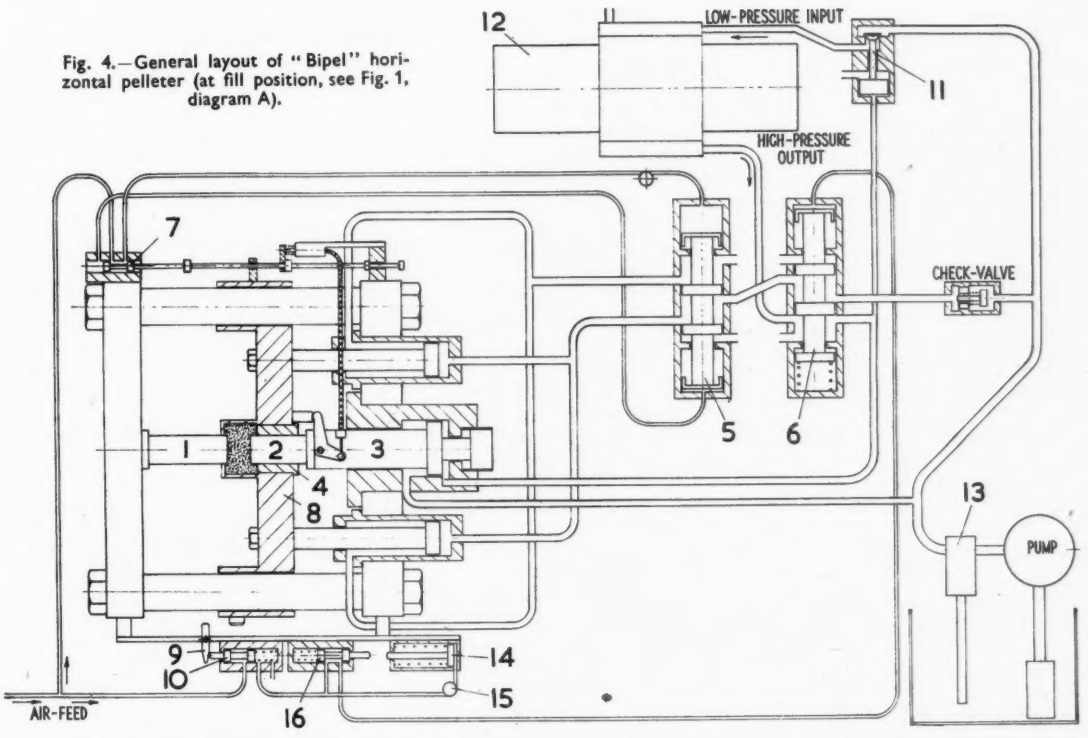


Fig. 4.—General layout of "Bipel" horizontal pelleter (at fill position, see Fig. 1, diagram A).

1.—Fixed punch. 2.—Moving punch. 3.—Hydraulic ram. 4.—Die. 5.—Traversing hydraulic valve. 6.—Pelleting valve. 7.—Traversing pilot valve. 8.—Die plate. 9.—Lever. 10.—Pelleting pilot valve. 11.—Automatic valve. 12.—Hydraulic intensifier. 13.—Relief valve. 14.—Air jack. 15.—Controllable valve. 16.—Secondary pilot.

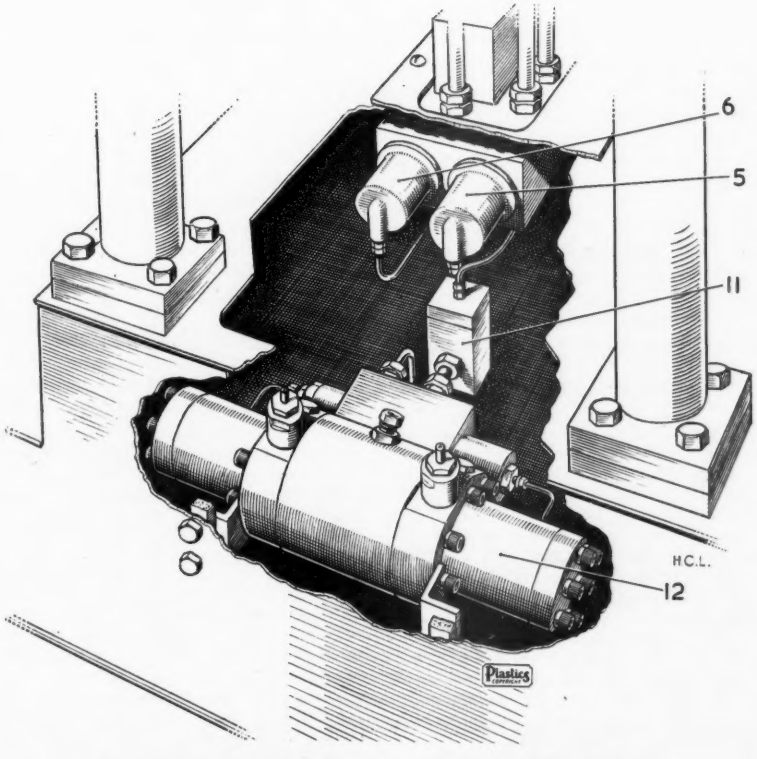


Fig. 5.—"Bipel" horizontal pelleter: details of part of hydraulic system.

powder. Such machines, however, are uncommon.

The large pellet of 1½ in. diameter and upwards is equally important, and the number required frequently does not justify the expense of a rotary machine. Single-action mechanical machines could be designed with a cushion, but the troubles and complications inherent in the shoe-filling device would still be present.

Fully hydraulic machines are available, but the designs tend to be adapted from moulding presses instead of being developed for the specific purpose of producing pellets. Such machines are, of course, vertical and the main ram must therefore travel a comparatively large distance to clear the filling shoe. This leads to waste of power and makes the machine slow in action. It is safe to say that the high power consumption and relatively slow action of the conventional all-hydraulic pelleter has up to now hindered its development.

A completely new approach to the problem was necessary and that has been found in designing a hydraulic single-action machine with a horizontal instead of the familiar vertical attitude.

The method adopted is clearly shown in diagrams A, B, C and D (Fig. 1), where 1 is the fixed punch, 2 is the moving punch attached to the hydraulic ram 3, and 4 is the die to which the hopper is

attached. The greatest distance between 1 and 2 can be altered to vary the pellet weight; this is done by an adjustable back stop for the ram. The die, together with the hopper, is moved by two hydraulic jacks.

Diagram A shows the fill position, the gap between the punches being in the lower part of the hopper.

Diagram B shows the die and hopper moved to the left, the gap between the punches (filled with powder) now being in the die; at this point the die moving jacks stop their motion.

Diagram C shows the pellet being made; here the ram 3 has moved forward at the same instant that the die jacks stopped, carrying the moving punch with it to compress the powder in the die.

Diagram D shows the die and hopper moved to the extreme left and the pellet ejected (the ram 3 moving back at the same time). The final movement is fast travel of the die and hopper back to the extreme right for the next fill.

For those interested in the more complete working of the machine, the following technical description is included. The drive is hydraulic and the control system is pneumatic. Referring to Fig. 4, the traversing hydraulic valve 5 is fed from the pump via the pelleting valve 6. Valve 5 is thrown by air pressure from the traversing pilot valve 7. Hydraulic pressure on the annulus of the pelleting ram is always the same as that in the pump circuit. When the die plate 8 moves from right to left it rocks the lever 9 and operates the pelleting pilot valve 10. This throws the pelleting valve 6 and transfers the pump flow from the traversing jacks to the pelleting ram. The latter moves forward until resistance is met when the pump pressure rises until the automatic valve 11 operates and energizes the hydraulic intensifier 12. The pressure in the pelleting ram circuit now reaches a maximum. That on the annulus rises to the adjustable pressure of the relief valve 13 and that in the main ram cylinder to three times the pump pressure due to intensification. When the pelleting pilot 10 was operated air was also fed into the air jack 14 through the controllable valve 15. This jack moves forward against its spring, giving a time delay. When it reaches the secondary pilot 16, the effect of the pilot 10 is cancelled and the hydraulic valve 6 is returned by its spring. This restarts the traverse of the die plate in the same direction, ejecting the pellet, the pressure in the circuit being enough to return the pelleting ram to its initial position. The main cylinder is exhausted to allow this, by the return of the valve 6. The intensifier is cut off by its automatic valve 11 by the fall of pressure in the main cylinder.

When the die plate has moved to the extreme right to eject the pellet the traversing pilot 7 is reversed, reversing the hydraulic traversing valve 5. No stop is made during the return travel because the lever 9 is rocked in the reverse direction and does not therefore operate the pelleting pilot 10.

The advantages of the horizontal method are numerous:—

Low Power Consumption.—The horizontal method of compression is ideal for hydraulic working as the main pressure ram makes only sufficient movement to compress the powder, there being no waste stroke. The only other effort required is the pellet ejection, and this is quite small. The machine is driven from an individual pump and the hydraulic circuit is designed so that pressure only builds up when required, i.e., during pelleting and ejection. The pump is therefore running more or less free for the greater part of the cycle.

Equal Pellet Density.—The die and hopper are free during the pelleting stroke, so that the action is equivalent to having pressure on both punches instead of one end only, as in conventional machines.

Machine Damage.—No machine damage can be caused by double loading. Should this occur all that happens is that a thicker preform of the same density is made. No filling or ejector mechanism passes through the danger area. On ejection, the pellet falls away by gravity, assisted by a small blast of air, if necessary.

Ease of Cleaning.—This is one of the important features of the machine. For the first time a pelleter can be cleaned down in a few minutes. The bottom of the hopper can be removed, allowing all powder to be dropped out at once.

No Powder Loss.—Almost no loss of powder occurs, all powder being pelleted. The reason for this will be at once obvious from the illustrations.

No Jamming of Punches in Die.—Vertical machines have the lower punch permanently in the die. The horizontal machine sweeps the edge of the die completely over each punch, clearing any powder away and preventing caking that so often jams and breaks the mechanism in conventional machines.

Material.—The machine will often handle powder considered unpelletable by normal means. This is the result of the hydraulic squeeze applied, and the length of time during which it is made to act.

Weight.—The weight of the pellets made on the horizontal machine is remarkably constant with granulated powder. The design is such that a larger machine could easily be adapted to make bigger preforms.

All control gear is pneumatic, fed from the shop air line. Four controls are provided, but only three are normally used. They are: (1) time delay for varying the pressure dwell on the pellet; (2) weight control; (3) pressure control (variable from 10-35 tons); (4) dwell at filling end. Controls 1, 2 and 3 are the ones normally in use; bad powders, with a large proportion of fines, sometimes need the adjustment of control 4.

The machine works with a maximum pressure (on the pelleting ram only during the squeeze) of 3,000 p.s.i. obtained from a "Bipel" intensifier. Pressures at the other parts of the cycle are under 100 p.s.i. The intensification enables the machine to be relatively small and an inexpensive low-pressure pump to be used. All hydraulic equipment is housed in the tank and completely sealed off from powder.

PLASTICS INDUSTRY EDUCATION FUND

THE Trustees of the Plastics Industry Education Fund, under their chairman, Mr. P. C. Allen, met on May 13 to consider the proposals of the Plastics Institute for expenditure in furtherance of the objects of the fund. Those objects are to publish monographs on the science and technology of plastics, to provide training grants and to assist in the provision of technical literature and equipment for educational establishments. The fund is managed by the Plastics Institute as agents for the Trustees.

The Trustees decided that £1,000 should be made available in 1952 for the award of 10 training grants for students; £1,000 for the revision and reprinting of four of the series of technical monographs originally published by the Plastics Institute; and £100 for travelling and educational expenses for apprentices attending recognized technical colleges. For the purchase of text books for the libraries of the local sections of the Institute £200 was allocated with a further special donation of £200 to establish a library for the newly formed South Wales and Monmouth Section.

It was agreed to allot £1,250 for the purchase of capital equipment for technical colleges during 1952, and the Trustees asked the Institute to make specific recommendations concerning the equipment to be purchased and the colleges to benefit.

In total, the sum made available or authorized by the Trustees for expenditure during 1952 was £4,700. Since the last meeting, when it was reported that a large part of the annual income of £4,000 aimed at would be provided by seven-year covenants and donations, further sums have been made available to the fund. Nearly £200 has been promised under deeds of covenant and £100 has been received by way of donations. In addition, the consent of the Inland Revenue has been obtained for the transfer of about £2,000 from the President's Fund of the Plastics Institute, which is being wound up.

While the response to the appeals for support for the fund have not been unsatisfactory, the Trustees hope that the generosity of the industry is not yet exhausted; further subscriptions are still needed.

Technique and Design of Pin-point Gating with Injection Moulds—II

By W. M. HALLIDAY

In this article further consideration is given to conventional gate and runner design forms and requirements, to give a comparative basis for appreciation of the design factors involved with pin-point gating.

WITH orthodox gating practice the gate opening will be maintained as short as possible, i.e., rarely beyond ½-in. in length back from the wall of the cavity. The shorter this can be held the better control will be obtained over the liability to freeze the charge passing through the opening, and thus better flow into the cavity will be attained.

Generally the shape and form of the gate in cross section will conform to that employed with runner channels. Thus if a split cylindrical runner is employed, with half portions machined into each parting line surface of the mould blocks, the gate must be of the same form, but in much smaller size. On the other hand, if a rectangular or trapezoidal shape of runner channel is used—as may be advisable to simplify machining—then a gate of the same cross-sectional shape should be employed. It is not good practice to use a gate channel of an entirely different cross-sectional shape from that of the runner channel. This will almost always lead to an abrupt interruption at the junction between runner channel and gate opening, which would incur additional risk of causing turbulent flow, and increased frictional resistance to the passage of the charge at that point.

The runner channels should also be maintained the shortest length in spanning between sprue channel and gates. Experimental tests have shown that the loss of injection pressure occurring between the orifice of the sprue channel and gates varies not proportionately to the length of runner channel, but approximately to the *square of runner length*. Thus it will be understood that unduly long runner channels may lead to a serious drop in injecting pressure, the effects of which may be shown in the physical properties of the finished moulding.

The location, size, and cross-sectional shape of the gate opening have, therefore, to be determined to ensure maximum flow of the material charge. This will best be obtained by ensuring maximum velocity on the charge passing through the gate opening; freedom from loss of temperature; the minimum frictional drag between outer layers of material and sides of gate channel; the absence of turbulence, and as far as practicable, the straight-line flowing action of the charge entering the cavity.

To this end, where split round type runner and gate channels are employed, with half portions machined in the respective mould halves, the sides of such channels should match up exactly when blocks are registered on the dowels. The surfaces of the runner and gate channels must also be polished in the smoothest manner, so that rough patches, tooling marks, nicks, etc., will be avoided.

Runner and gate channels of circular cross-sectional shape usually give best results so far as flow is concerned, because these offer the least amount of surface area to the passage of the charge, and therefore frictional resistance will be least. The hot centre core layers may therefore flow more quickly into the cavity.

Rectangular or half-round runner channels and gates are, however, often to be preferred for several practical reasons. Generally these will be wholly contained within one mould block, hence no accurate registration of halves is entailed as with the circular channel. Their use will give best results when length of runner can be kept very short, or where the layout of the runner system is complex, and channels cannot follow straight lines.

A comprehensive and detailed examination of the basic feeding and flowing conditions with conventional gates in injection moulds, by H. K. Barton, is to be found in "The Toolmaker," Oct.-Nov., 1948. Whilst this work is essentially a comparison between flowing actions of pressure die casting dies and injection moulds, much valuable information is given regarding the latter.

Form of Gate

In the design of material-feeding systems for injection moulds, one of four different cross-sectional shapes of runner channel and gate opening will be available for selection. To a large extent the choice of any of these shapes will be determined by a number of important factors, chief of which are the following:—

(1) The length of runner channel from sprue to cavity or gate opening, and its influence upon the "flow" capacity of the plastics material.

(2) The type of plastics material and its inherent running qualities.

(3) The simplicity or complexity of the entire runner lay-out, i.e., whether this is

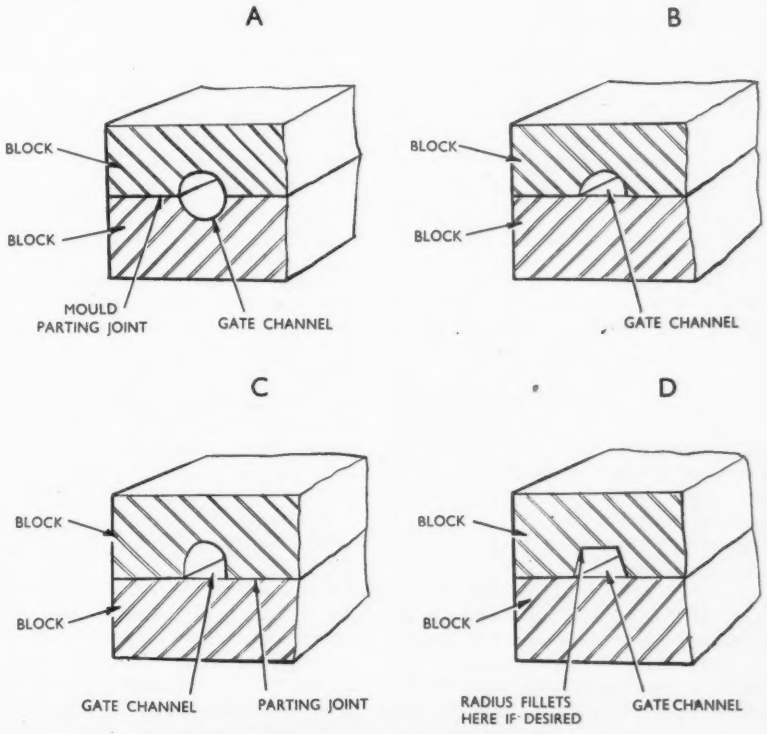


Fig. 1.—Cross-sections of gate channels in common use.

composed substantially of straight-line channels, or embraces considerable deviation from such simple form.

(4) The facilities presented for machining runner and gate channels in the most economical manner.

(5) The character of the cavity formations and how their location or capacity will affect rapidity of fill.

(6) The effect of the runner system upon the thermal balance of the mould.

(7) The presence of cores, or projections, in the cavity liable to impede the flow of material.

Very often, however, the ease with which the runner channels, etc., may be reproduced in the parting-line surfaces of the mould blocks, or to avoid having to machine both blocks in that manner to give a matched channel formation, will determine the shape to be used. This will be the case especially with moulds for components of very simple shape which can be fed at a single point, and where the length of runner can be kept very short. In such circumstances it is quite common to use runner and gate channels of rectangular or trapezoidal cross-sectional shape, with their side walls suitably "splayed" at an angle. These need only be machined in one block (usually the movable member), thus no precision matching or special tooling is entailed, therefore cost of manufacture will be relatively small.

The four diagrams given at Fig. 1 illustrate the four cross-sectional shapes of runner and gate which are in most common use.

The Round or Cylindrical Gate

Diagram A depicts what is known as the "round" or "cylindrical" gate, which term, it will be noted, refers solely to the cross-sectional shape, and not to the direction followed by the gate from the point of juncture with the runner channel and leading to the cavity side wall.

It comprises two identical channels or grooves, cut one into each mould block, on the parting joint surfaces, each channel being semi-circular in shape. Both are machined exactly the same depth, so that when the two blocks are brought together into the closed (injecting) position and registered therein by the dowels, a completely cylindrical channel is formed at both runner and gate portions, as shown.

It will be observed with this shape of gate (and runner) there is a complete absence of any straight portion on side walls of the channel. This is a feature of some importance, because it provides the maximum amount of "draft" or easement for extracting the waste runner/gate material when the mould is opened for the ejection of the finished moulding.

Exact lineability and matching of the two halves of the channel will be necessary, a requirement often giving rise to certain machining difficulties and objections. For example, if the runner/gate system should embrace a large number of such channels, having to follow a somewhat intricate geometrical pattern composed of a number of curved or irregular tracks rather than perfectly straight channels, machining and close matching at all points may be exceedingly difficult to achieve.

The ratio of surface area to volume of such cylindrical channels will be less than with any of the other common shapes in use. This means that the frictional resistance offered to the passage of the hot plastics charge will be less, and the tendency for the charge to lose heat by radiation into the mould surrounding such channels will also be reduced.

The "Half-round" Gate

The gate shown in diagram B (Fig. 1) is termed the "half-round" gate, because of its cross-sectional shape. With this form only a *single* groove is required machined wholly into the parting-line surface of a single mould block. In practice, it will usually be advantageous to locate it within the movable block.

The "U-shaped" Gate

Diagram C (Fig. 1) shows the "U-shaped" gate, which again is a single channel machined entirely within one block. The depth of this form of channel may be made considerably greater than with the two preceding examples and will generally be used where some restrictions exist in respect of the permissible *width* of gate, and when ample capacity is required combined with the *narrowest* gate. This type of gate is often used with multiple impression moulds, where the cavities have to be closely situated together in a somewhat congested manner forbidding use of width gate channels.

The side of this channel may be formed perpendicular, or with a slight outward inclination, as shown herewith. The maximum width should always lie at the parting line, of course. A small degree of taper, i.e., 1 to 3 degrees per side in the fashion depicted, will often facilitate the simpler ejection of the waste material in the runner-gate grooves.

The "Trapezoidal" Gate

The fourth type shown at D (Fig. 1) is known commonly as the "trapezoidal" gate. It consists of a flat-bottom channel formed along the same plane as the normal parting line of the mould, with which surface it is usually parallel, although this is not critically necessary. The sides of the groove are amply inclined in the manner illustrated, again in such a direction to bring the maximum width at the parting-line joint in the block. The sides are usually disposed at angles ranging from about 10 to 25 degrees, with the greatest angle within that range used with the deepest channel.

This gate is formed wholly within one block. If desired, perfectly sharp corners may be provided at the junctions between the two sides and the flat base portion, or alternatively a very slight radius fillet may be formed in each case. This will often be found to simplify later polishing of the channel surfaces, and will assist, too, in avoiding the onset of heat-checking of the surface skin of the mould material.

Of these four types of gate channel shape, that at A is the most effective from the point of view of volumetric capacity in relation to size. It is, however, the most costly to produce in a mould, because two separate channels have to be machined, and their depth, width and radius portions have to be identical within precision limits.

With the three other types of cross-sectional shapes of gate, B, C and D, serious or costly toolmaking and manufacturing difficulties will not generally arise, and thus in practice one or other of these will usually be selected in order to simplify production and to reduce mould costs. Type D (the "trapezoidal" gate) is particularly useful, being easy to reproduce, offering the best facilities for subsequent polishing operations, and the simplest form of tooling for machining.

The first three types of gate shape will require an end-milling cutter or D-shape bit having a half-round cutting edge, which will be notoriously more difficult to fashion accurately in the first place, and to maintain in a keen cutting condition and true shape over later resharpening operations, than with a simple flat-end tool of the kind necessary to produce a rectangular or trapezoidal shape of gate, etc.

(To be continued)

STANDARD LIMITS AND FITS FOR ENGINEERING

After several years' preparation, the technical committee of the British Standards Institution has prepared a new draft of B.S.164 entitled "Limits and Fits for Engineering." The recommendations in this new British Standard—Part 1 of which is now published in draft form—apply particularly to fits between cylindrical parts, briefly designated as "holes" and "shafts," the ultimate object being to introduce a universal inch system of limits and fits. Based on the International Standards Association tolerance system, the size range at present is from 0.04 in. to 19.686 in., although work is being undertaken on other sizes. The new Standard proposes suitable combinations of 16 qualities of tolerance, or, in other words, grades of accuracy of manufacture; and 21 grades of fit for both hole and shaft, ranging from fits of extreme interference to those of extreme clearance.

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. The country of origin for Convention Applications is shown in parentheses. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2s. 8d. each (including postage).

B.P. 661,952. Coating compositions. R. H. Sturm. To: Cosmocord Plastics, Ltd.

Steel, iron, zinc, alloys are made rust-proof by a coat containing a thermosetting synthetic resin, a metal phosphate and phosphoric acid.

B.P. 661,964. Process for the preparation of rapidly hardening castable phenol-formaldehyde resins and castings produced therefrom. To: Nederlandse Organisatie voor Toegepastnatuurwetenschappelijk Onderzoek ten behoeve van Nijverheid, Handel en Verkeer (Netherlands).

Selenium dioxide is added to a castable phenol-formaldehyde resin pre-condensed in alkaline medium.

B.P. 662,007. Aminoplastic resin compositions containing latent curing catalysts. E. F. Morfit. To: British Industrial Plastics, Ltd. (Conv. U.S.A.)

B.P. 662,013. Fabricating strip stock from synthetic linear polyamides. E. E. Montross, P. L. Schurr. To: Polymer Corp. (Conv. U.S.A.)

The strip is prepared in a liquid cooling bath between forming rolls from a stream of molten polyamide.

B.P. 662,020. Method of making pigmented polystyrene. A. Abbey. Comm. from: Dow Chemical Co.

B.P. 662,026. Packages for artificial teeth. M. M. Maclaire-Hillier.

The acrylic resin teeth are pressed in a tacky surface on an opaque sheet. The surface is transparent so as to enable a purchaser to test porosity by holding the package against light.

B.P. 662,162. Copolymers. To: United States Rubber Co. (Conv. U.S.A.)

A tris-2-propenyl aconitate with a 2-propenyl alcohol is heated in the presence of a catalyst. For castings, mouldings or, dissolved, as lacquers, impregnating and waterproofing compounds.

B.P. 662,187. Crown cork stoppers. R. F. Harvey. To: Telegraph Contruction and Maintenance Co., Ltd.

Polyethylene is applied to the facing of the cork disc to protect it from contact with the contents of the bottle. Polyethylene is inert i.a. to acids (in beverages).

B.P. 662,219. Open-mouth container and non-snap type closure therefor. E. S. Tupper.

The closure is formed from polyethylene moulded by compression or injection and opened through local distortion by finger pressure.

B.P. 662,326. Ash-trays. J. B. MacLaughlin.

B.P. 662,331. Production of synthetic resinous materials reinforced with fibrous asbestos. C. G. Evans, P. H. H. Bishop. To: National Research Development Corp.

A mass of parallel fibres crushed from asbestos rock is carried on a travelling band through a bath of synthetic resinous material.

B.P. 662,365. Production of new polyesters from 4-vinylcyclohexene dioxide and coating compositions containing them. To: Canadian Industries, Ltd.

B.P. 662,370. Jets and nozzles. U. A. F. Williamson. To: Minister of Supply.

Natural or synthetic plastics form the surfaces of the passages (Patent of addition to 635,567).

B.P. 662,465. Electrical insulation. To: Westinghouse Electric International Co.

A base layer of polytetrafluoroethylene receives an adherent coating of petroleum asphalt. (Conv. U.S.A.)

B.P. 662,482. Artificial breast. E. H. Bernhardt. (Conv. U.S.A.)

Front and rear walls of breast forming cells are made from plasticized copolymers of vinyl chloride and vinyl acetate.

B.P. 662,500. Closure for bottles, jars and the like. M. A. Bussmann.

The (plastic, metal or combined plastic-metal) pressed-over closure can be repeatedly re-used.

B.P. 662,562. Adhesive compositions and methods of bonding. J. L. Perkins, E. E. Sylvester. To: B.B. Chemical Co., Ltd. (Conv. U.S.A.)

B.P. 662,626. Interpolymers. To: United States Rubber Co. (Conv. U.S.A.)

New ternary interpolymers can be obtained when castor-oil maleate is interpolymerized with styrene in the presence of a cyclic terpene hydrocarbon.

B.P. 662,633. Urea formaldehyde compositions. W. R. J. Happé. To: Happé Products, Ltd.

Urea formaldehyde compositions in liquid, solid or plastic form are prepared with an albuminous plasticizer in the presence of free urea. The liquid mixtures are filled into a mould and the compound becomes hard after a few minutes in a hot bath.

B.P. 662,810. Low-pressure phenol-aldehyde resins. To: Nederlandse Organisatie voor Toegepastnatuurwetenschappelijk Onderzoeck ten behoeve van Nijverheid, Handel en Verkeer. (Conv. Netherlands.)

A hardening catalyst is employed of a mixture of resorcinol and selenium dioxide. The solution is extremely suitable for impregnating fabric, paper for panels (building), cured after moulding.

B.P. 662,864. Display of protective bags. E. S. and A. Robinson, Ltd., K. W. Davies, J. A. Crabb.

A container of transparent plastic material has a reinforcing strip of paper along its opposite edges at the filling end.

B.P. 662,877. Synthetic polymers from hydroxy amino acids. To: Organico. (Conv. France.)

B.P. 662,913. New polymerizable substances and polymers obtained therefrom. To: Soc. des Usines Chimiques Rhône-Poulenc. (Conv. France.)

B.P. 662,926. Vulcanizable adhesive compositions. To: Dow Chemical Co. (Conv. U.S.A.)

85 to 92 per cent. vinylidene chloride, 15 to 8 per cent. acrylonitrile and 4 to 8 parts tetramethyl or tetraethyl thiuram disulphide for each 100 part of the copolymer are intimately mixed.

B.P. 662,950. Moulding a plastic shoe. J. J. Booth.

Plastics of different characteristics and/or colours, but capable of uniting together, are introduced into a mould at separate points to form an integral sole, heel and upper.

B.P. 662,957. Injection moulding machines. R. Davidson, C. Butterworth.

The spring-loaded longitudinally movable and electrically heated cylinder moves downward under spring pressure to die-box sealing position (begin of operative stroke). When the ram inside the cylinder returns (end of retractive stroke) the cylinder is moved back against spring pressure and the die-box holding jaws open whilst their operative faces remain parallel.

B.P. 662,979. Copolymers. To: United States Rubber Co. (Conv. U.S.A.)

B.P. 663,002. Goggles. T. J. Rogers, J. A. Rogers.

The frame (two beadings connected by a flat band) is formed from an extruded strip of plastic enclosing a single sheet of transparent material (plastic) with a nose recess at its lower edge.

B.P. 663,036. Pressure-sensitive adhesive tape. H. J. Tierney. To: Minnesota Mining and Mfg. Co. (Conv. U.S.A.)

Paper is impregnated with a rubbery butadiene-acrylonitrile copolymer in a certain way and then coated with a normally tacky pressure-sensitive adhesive.

B.P. 663,043. Aircraft components having anti-icing means and method for applying such anti-icing means. Dunlop Rubber Co., Ltd., H. F. L. Jenkins, A. E. T. Neale, R. N. Thomson.

Phenol-formaldehyde resins, polymethyl methacrylate resins or, in particular, a resorcinol-formaldehyde resin (in admixture with rubber latex) form excellent coatings.

B.P. 663,060. Process and apparatus for restoring a thermoplastic phonograph record disk. D. F. Balmer. To: Soundscriber Corp. (Conv. U.S.A.)

The disk is heated while rotated about a horizontal axis to maintain it flat.

B.P. 663,072. Compositions comprising organic thermoplastic substances. To: British Celanese, Ltd. (Conv. U.S.A.)

Butanediol esters of a certain type serve as solvents or plasticizers in the production of cellulose derivatives for obtaining excellent moulded products of good colour, transparency and impact strength.

B.P. 663,079. Acetone resin modified phenol resin. To: Bakelite Corp. (Conv. U.S.A.)

The composition is particularly useful for bonding glass wool.

B.P. 663,081. Spools or bobbins. Mica and Micamite Supplies, Ltd., F. A. Parsons.

A bobbin, of new design, e.g., suitable for silk spinning may be made of paper-phenol-formaldehyde-resin laminate with locking disks of the same material or of fabric-resin laminate.

B.P. 663,094. Production of resins from phenolic mixtures. To: Entreprises Albert Cochery SA. (Conv. France.)

Time, temperature, concentration is controlled so as to moderate the condensation reaction, stopping it before the product has become water insoluble.

B.P. 663,118. Transfer and injection moulding machines. Dunlop Rubber Co., Ltd., W. A. Gurney.

A plunger of resilient deformable material (rubber) is used in a cavity of maximum

cross-section at one end and reduced diameter at the other end. Leakage of material past the plunger is thus prevented. This is particularly important when moulding vulcanizable rubber compounds. The machine, however, is applicable to the moulding of thermoplastic and thermosetting materials in general.

B.P. 663,148. Dissolving or softening polyvinyl compounds. To: Celanese Corp. of America. (Conv. U.S.A.)

Solvents and softening agents with a basis of methylal are excellent in the preparation of, e.g., coating or adhesive compositions, for sheets, for shaping or treating formed materials.

B.P. 663,154. Hygienic telephone mouthpiece wiper. A. B. Davies.

Cylindrical plastic container for storing and dispensing disinfectant-containing paper.

B.P. 663,164. Process for the polymerization of polymerizable liquid compounds. Howards and Sons, Ltd., R. H. Lock.

Monomeric compounds such as methyl acrylate, alkyl methacrylates and vinyl esters are polymerized while controlling the rate of addition of the monomeric compound to the aqueous medium in a certain way.

B.P. 663,268. Method of preparing copolymers of acrylonitrile. A. H. Stevens. Comm. from: Monsanto Chemical Co.

B.P. 663,315. Coating of articles with plastic material. To: Dekoron Corp.

Thermoplastic material is hot extruded in tubular form through a die through which sections of tubing or rod are also pushed in the same direction but faster, so that the plastic tube is stretched. It adheres tenaciously to the tubing and hardens in place.

B.P. 663,373. Feed-mechanisms for feeding lengths of work to or in a machine. W. T. Johnson.

The drawing represents feeding of tubes of thermoplastic material filled with liquid or paste to devices which seal, close and sever the tubes. One of the feeding rollers is made of rubber and the lateral pressure is adjustable.

B.P. 663,375. Filling long flexible tubes for tube-sealing machines. W. T. Johnson.

The tubes of flexible thermoplastic material (polyvinyl chloride) are spirally coiled on a rotatable horizontal tray and the filled tube moves downward to the tube-sealing dies.

B.P. 663,389. Means for jointing metal members to members of laminated material. D. R. Bishop. To: Hordern-Richmond, Ltd.

A laminated shuttle (from veneers bonded with thermoplastic or thermosetting resin) has a non-metallic insert (wood; rubber) at each end in which a steel tip is inserted.

B.P. 663,428. Hollow plastic structural units and method of making the same. D. Gonda. (Conv. U.S.A.)

A panel composed of laminated helically wound tubes is so assembled that alternate tubes or groups have their strips coiled in opposite directions. The laminates are made from fibrous material bonded by hardened thermosetting plastics.

B.P. 663,496. Plastic milling process and apparatus. To: Bakelite Corp. (Conv. U.S.A.)

Continuous fluxing and milling is carried out between a pair of rolls having intermeshing V-shaped right- and left-hand threads and rotating in opposite directions. The threads of each roll are interrupted by a non-threaded surface and each such section forms with a barrier a passageway. The threads convey the material fed from a hopper in finely divided form to the passageway subjecting the material to pressing, tearing and shearing with intimate contact of fluxed and unfluxed material until completely fluxed.

B.P. 663,509. Rotatable knobs or handles. T. Lamb.

An undulating groove around the knob makes it conform more to the anatomy of the human hand.

B.P. 663,555. Copolymers of styrene. To: Monsanto Chemical Co. (Conv. U.S.A.)

B.P. 663,563. Injection moulding copolymers. A. B. Craig. To: Monsanto Chemical Co. (Conv. U.S.A.)

Terpolymers of styrene, acrylonitrile and alphamethyl styrene in certain proportions do not exhibit the inherent disadvantageous properties of the monomeric compounds. They are highly suitable for injection moulding.

B.P. 663,599. Organo-silicon modified alkyd resins and a process for their manufacture. To: Dow Corning, Ltd. (Conv. U.S.A.)

B.P. 663,618. Containers for liquids. P. Garretto. (Conv. France.)

A flask, e.g., for concentrated perfume, is held in a spherical casing of metal or plastics so that the upright position of the flask is not affected when the casing is rolling about.

B.P. 663,626. Insertion of metallic reinforcements into plastic substances. A. A. Naber, R. E. Polden.

A holder for the softened component (thermoplastic sidearm for spectacles) supports it so as to prevent change of section. The reinforcement (wire) is held aligned with the component and forced by a reciprocating power-operated blade into the component.

B.P. 663,629. Resistor and method of making the same. M. L. Barfield, J. J. Gurtowski. To: Government U.S.A. (Conv. U.S.A.)

The resistor body of high density (for electronic circuits) is produced from a mixture of a comminuted melamine formaldehyde thermosetting resin, a comminuted filler of insulating material and a conductive material dispersed therein.

B.P. 663,645. Production of moisture-proof sheet wrapping materials. C. R. Oswin. To: British Cellophane, Ltd.

A moisture-proof layer of vinylidene chloride/accylonitrile copolymer is introduced in the form of an aqueous dispersion between two sheets of regenerated cellulose film fed over two inwardly rotating rollers. The sheets are then separated, dried, reintroduced between the rollers with their coated sides towards the rollers (for spreading the layers), finally dried and the layers fused.

B.P. 663,659. Stringer tapes for fasteners. To: Waldes Koh-I-Noor Inc.

Part of the threads of a tape for slide fasteners is made of thermoplastic material to be heat-sealed to a thermoplastic portion of a handbag, raincoat or the like.

B.P. 663,660. Interpolymers. United States Rubber Co. (Conv. U.S.A.)

B.P. 663,732. Manufacture of textile materials from wool, hairs, cotton and like fibres, by bonding the fibres by means of plastic materials. B. M. Glover.

B.P. 663,736. Cationic urea formaldehyde resin and its applications. T. J. Suen, J. H. Daniel. To: British Industrial Plastics, Ltd. (Conv. U.S.A.).

B.P. 663,756. Polymerization of chloroethylenes. V. L. Folt. To: B. F. Goodrich Co. (Conv. U.S.A.).

B.P. 663,761. Manufacture of polyamides by condensation in presence of a catalyst. V. F. Feeny. Comm. from: Organico.

B.P. 663,808. Composite match plate for use in foundries. To: Cooper Alloy Foundry Co.

"Match plates" are placed between the flasks of a mould when packing in the sand and are removed for the casting operation. In the new plate, the pattern insert is made of liquid phenolic casting resin.

B.P. 663,823. Method of producing a stably tacky eucohesive pressure-sensitive adhesive and the pressure-sensitive adhesive resulting from said method. C. J. Ebel. To: Minnesota Mining and Mfg. Co. (Conv. U.S.A.).

The product is based on a sub-rubbery butadiene-styrene copolymer with a certain phenol-aldehyde resin or a self-vulcanizing organic accelerator of the thiuram-polysulphide type.

B.P. 663,841. Artificial resins and processes of making the same. To: Monsanto Chemical Co. (Conv. U.S.A.).

B.P. 663,867. Pouring spouts for containers and containers furnished with such spouts. F. H. Packer, W. Van Leer. To: General Stampers, Ltd.

The self-supporting spout is made of rubber or a rubber-like material, such as polyvinyl chloride (oil-resistant).

B.P. 663,951. Fountain pens. To: Parker Pen Co. (Conv. U.S.A.).

Body and barrel are moulded of plastic material. Arrangement of polished metal guard between sac and barrel to protect sac from external heating effects. Breather tube (silver) and vent to prevent leakage at sudden changes of atmospheric pressure.

B.P. 663,956. Inserts for tube ends. F. C. W. Wilkinson, Crane Packing, Ltd.

The flared mouthpiece of a rubber tube is made of synthetic plastic.

B.P. 664,022. Sewing machine frames. To: Zbrojovka Brno O.P. (Conv. Czechoslovakia).

The frame is constructed from thermoplastic material in two parts (divided along a vertical plane through its longitudinal axis).

B.P. 664,075. Cups, saucers, jugs and like crockery. W. Davis, H. S. Jones.

A removable disc (e.g., plastic) in a hole at the bottom of the article (e.g., of plastic material) reduces temptation to pilfering.

B.P. 664,126. Method of manufacturing interpolymers. T. A. Clayton. Comm. from: United States Rubber Co.

Polyolefinic 2-alkenyl esters are interpolymerized with 3-hydrocarbon-2-alkenals.

B.P. 664,128. Method and device for cutting and high-frequency welding parts of thermoplastic material in one operation. Bell Telephone Mfg. Co. S/A. To: Standard Telephones and Cables, Ltd. (Conv. Netherlands).

The upper one of two electrodes penetrates with a projecting rim through the gradually softened sheets. The final cut is made simultaneously with pressure welding while the rim touches insulating layer on lower electrode.

ask your moulder . . .

This is the sixth in a series of announcements designed to assist Buyers in purchasing plastics moulded articles or components.

Particularly in the sphere of design the well-equipped, fully-experienced moulder can give yeoman service. Design in this sense is used to cover both the visual form (or styling) of the product and also the mould used for it. The two are inter-related and it is of infinite advantage to have both creative designers and tool draughtsmen working together in close association. A moulder who has such a service available is in a position to style your product completely. Or he may be able to adapt the design of a product made in other materials so that it can be moulded economically in plastics; or, from your own drawings to suggest slight modifications which enable the product to be moulded more satisfactorily or at a reduced cost.

This service, where it exists, is invariably offered free of charge; so if you are a Buyer of plastics mouldings on a substantial scale, make sure that the service is there, even if you do not plan to use it at the moment. You may want it some day.

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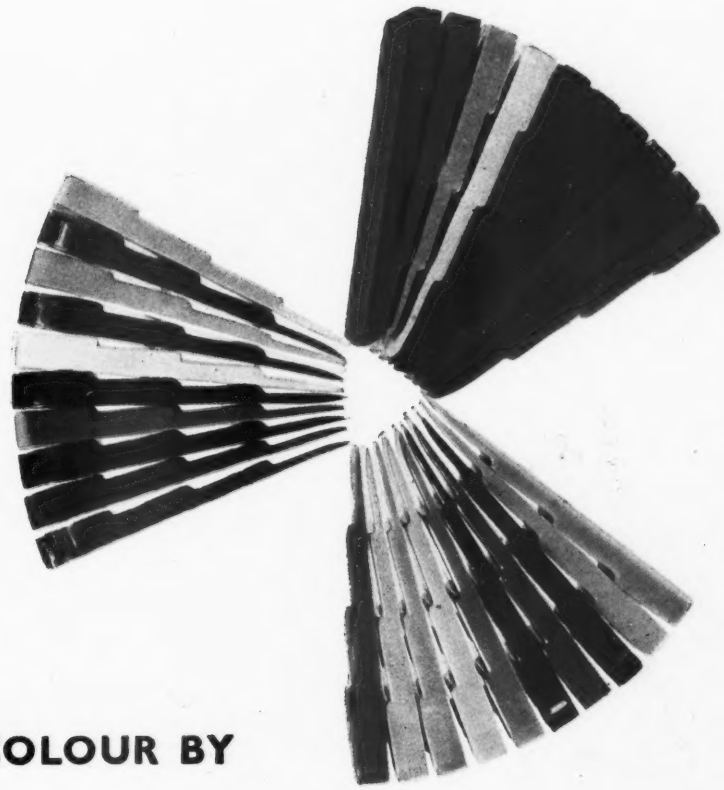

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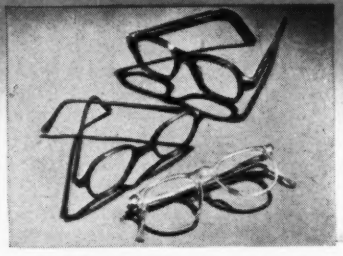
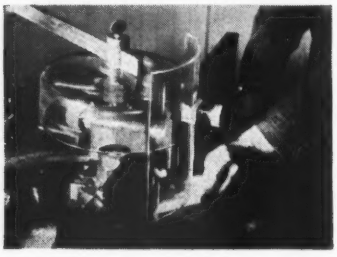
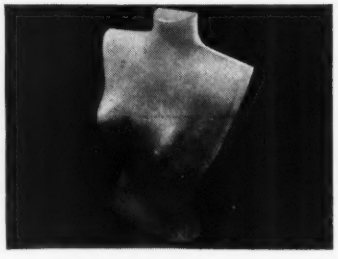


SPECTACLE FRAMES. In flesh pink, ice blue, crystal, and shell mottles 92, 94, 97. Also tinted sheets for sunglasses. Spectacle frames in 'Celastoid' keep their shape, and are durable and completely *safe*.



MACHINE GUARDS. Supplied in thicknesses up to 6 mm., 'Celastoid' is ideal for machine guards of all types, because of its toughness, durability, transparency, and because it can easily be formed to simple or compound curves.

LABELS, PRICE TICKETS. Can be printed in multi-colours, engraved or embossed. Labels and tickets of any shape can be blanked or formed from 'Celastoid' Sheet, and bring originality and style to merchandising.



DISPLAY FIGURES. Display figures like this, formed from 40/1000" 'Celastoid' Sheet and spray-finished, give added sales appeal to lingerie for window displays, showrooms, etc.

'Celastoid' Sheets are available in standard sheet sizes 49" x 21", 52" x 24", and 56" x 25" approximately, in thicknesses of 10/1000" upwards.

'Celastoid' Sheets are washable, durable and can be supplied in several finishes — in clear transparent and in black, white and transparent, translucent or opaque colours. The services of our Technical Development Section are freely available for consultation and, where possible, for practical demonstrations of the application of our Plastics.

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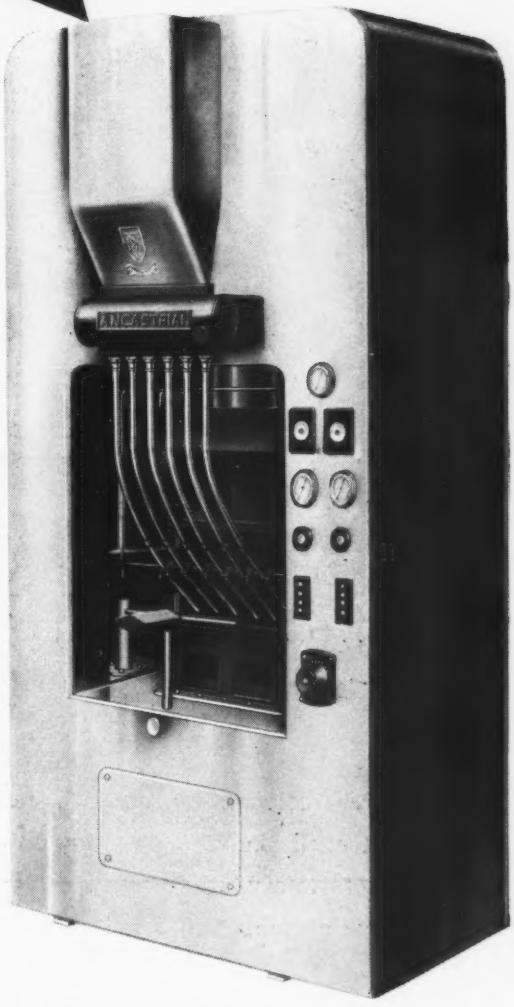

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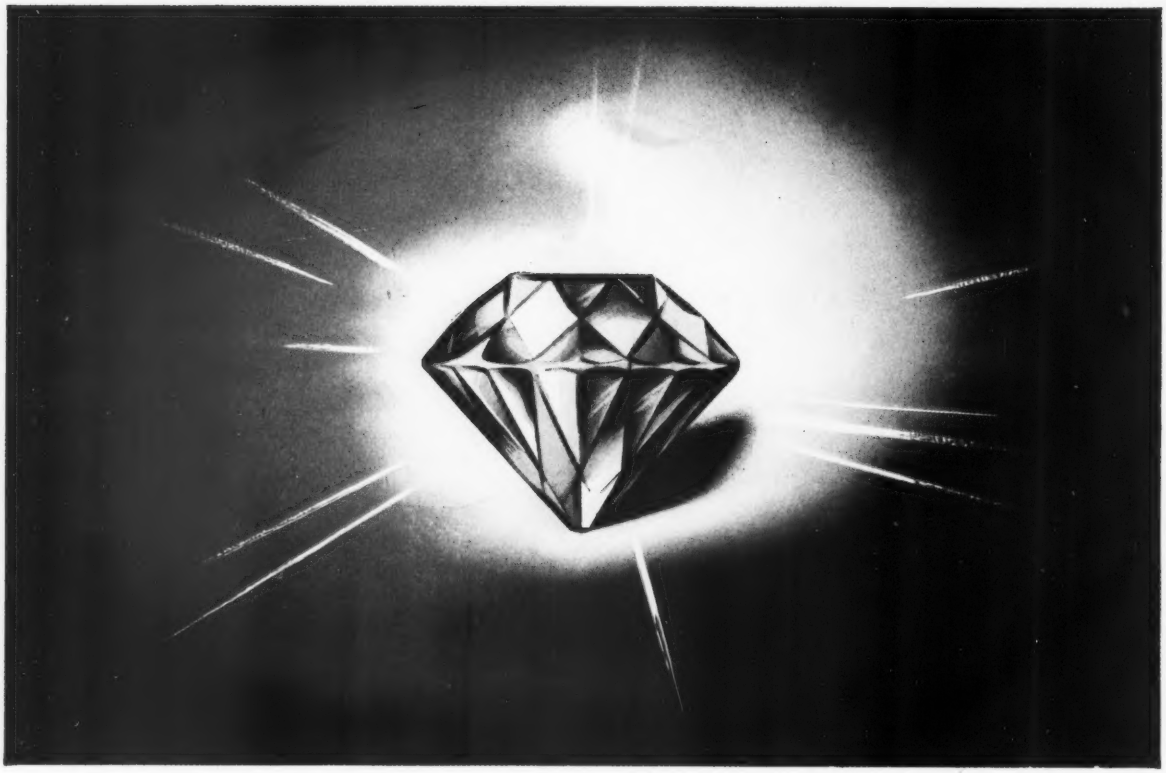

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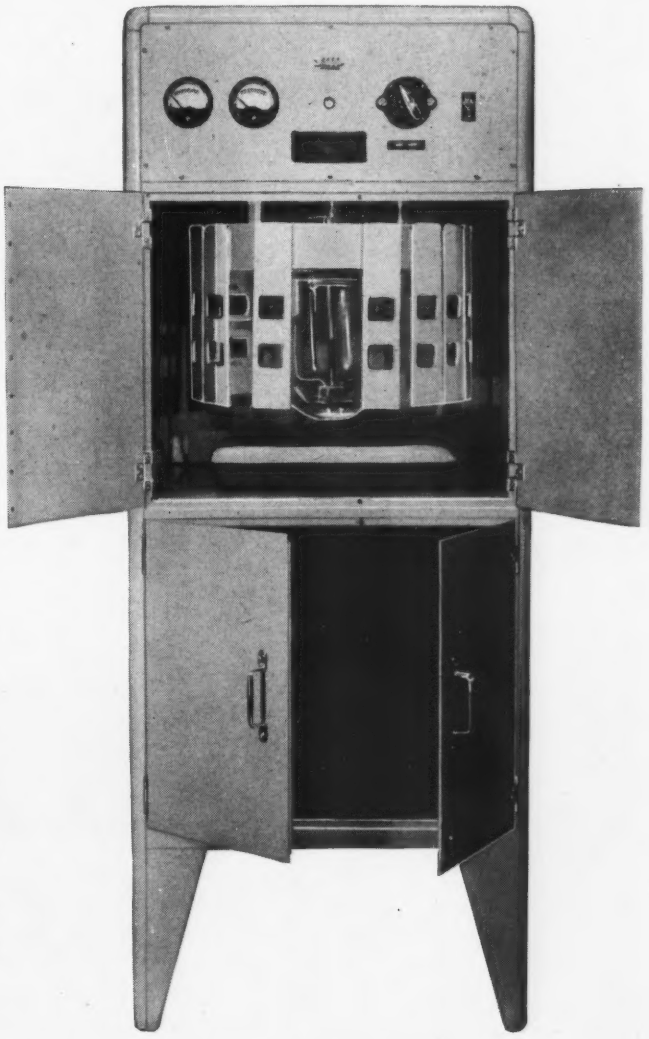

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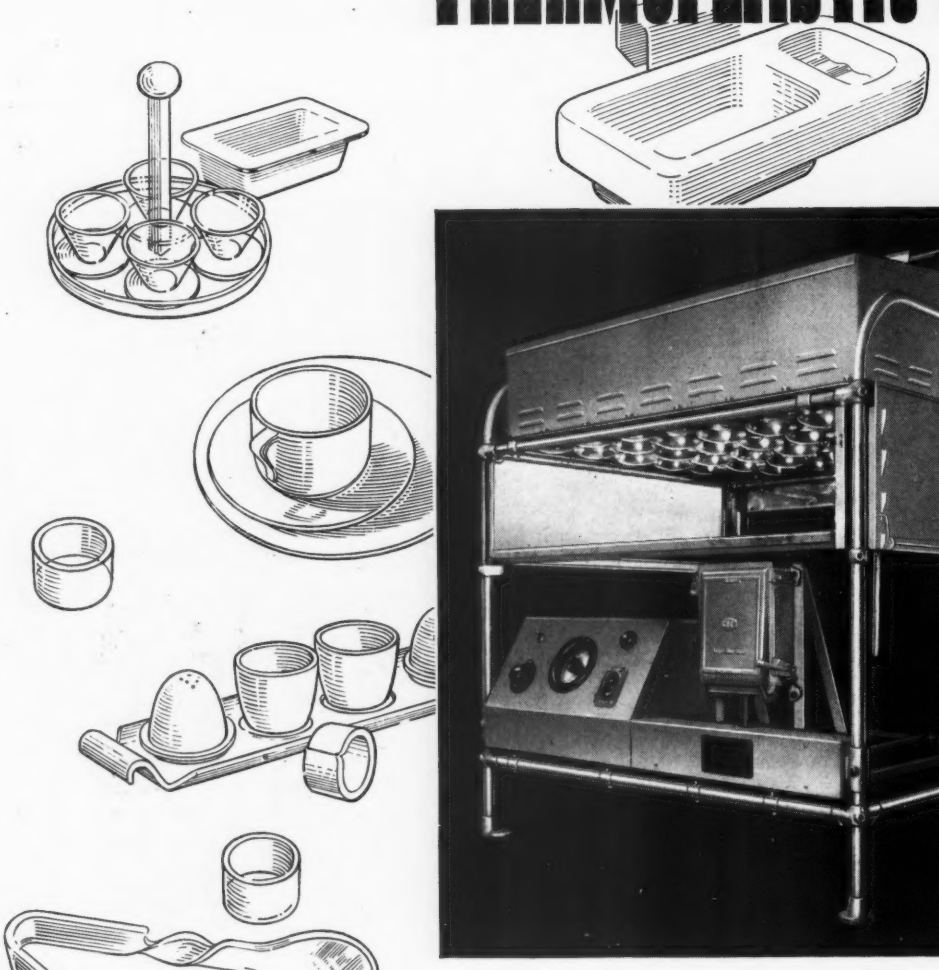

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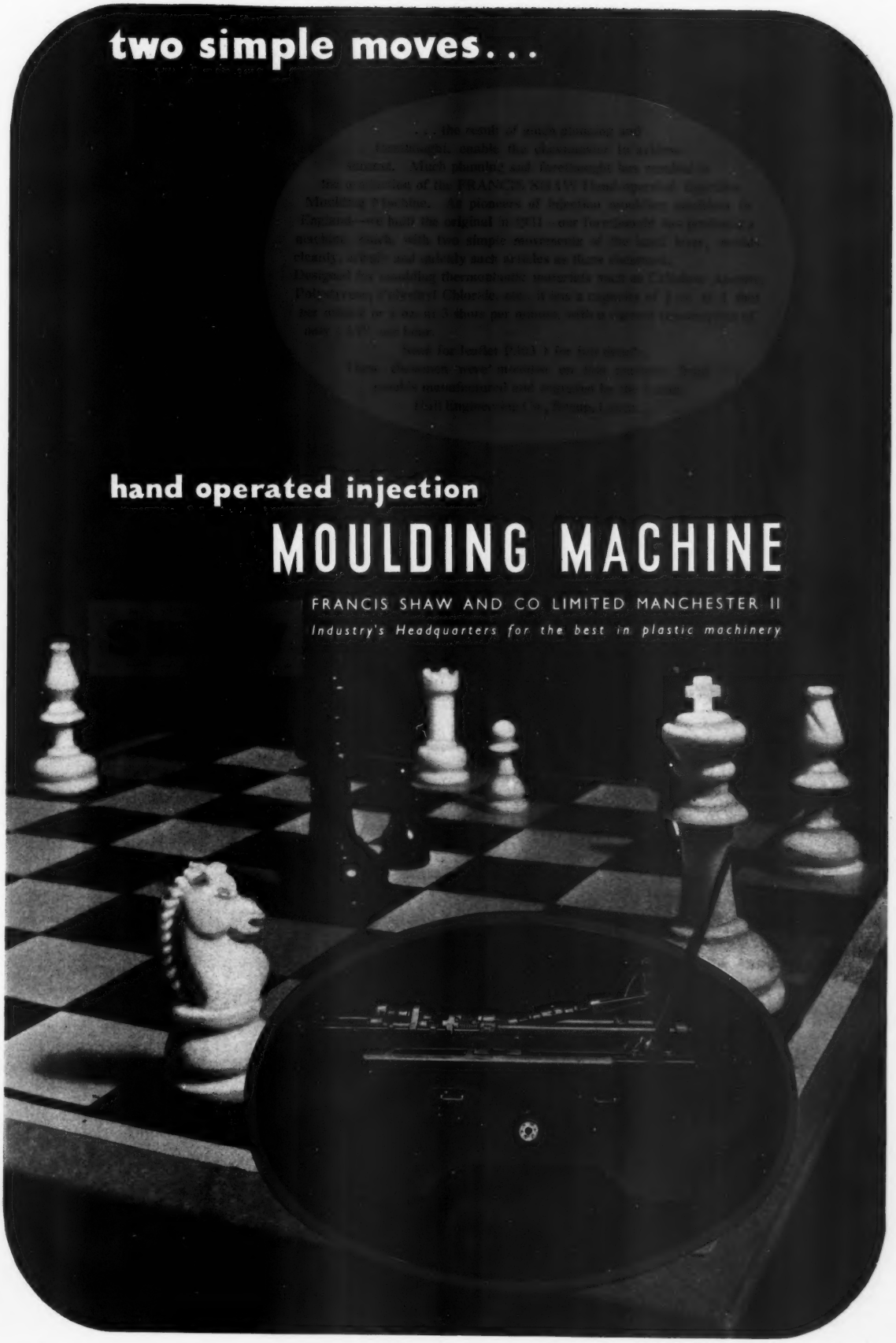
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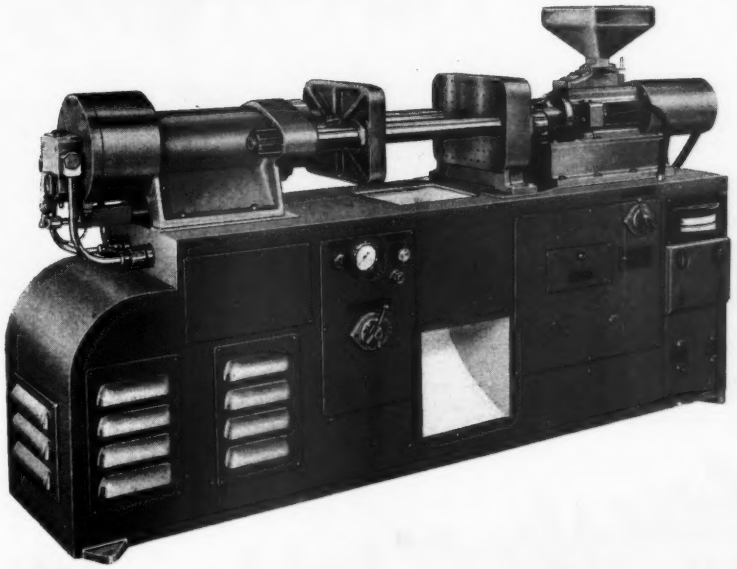

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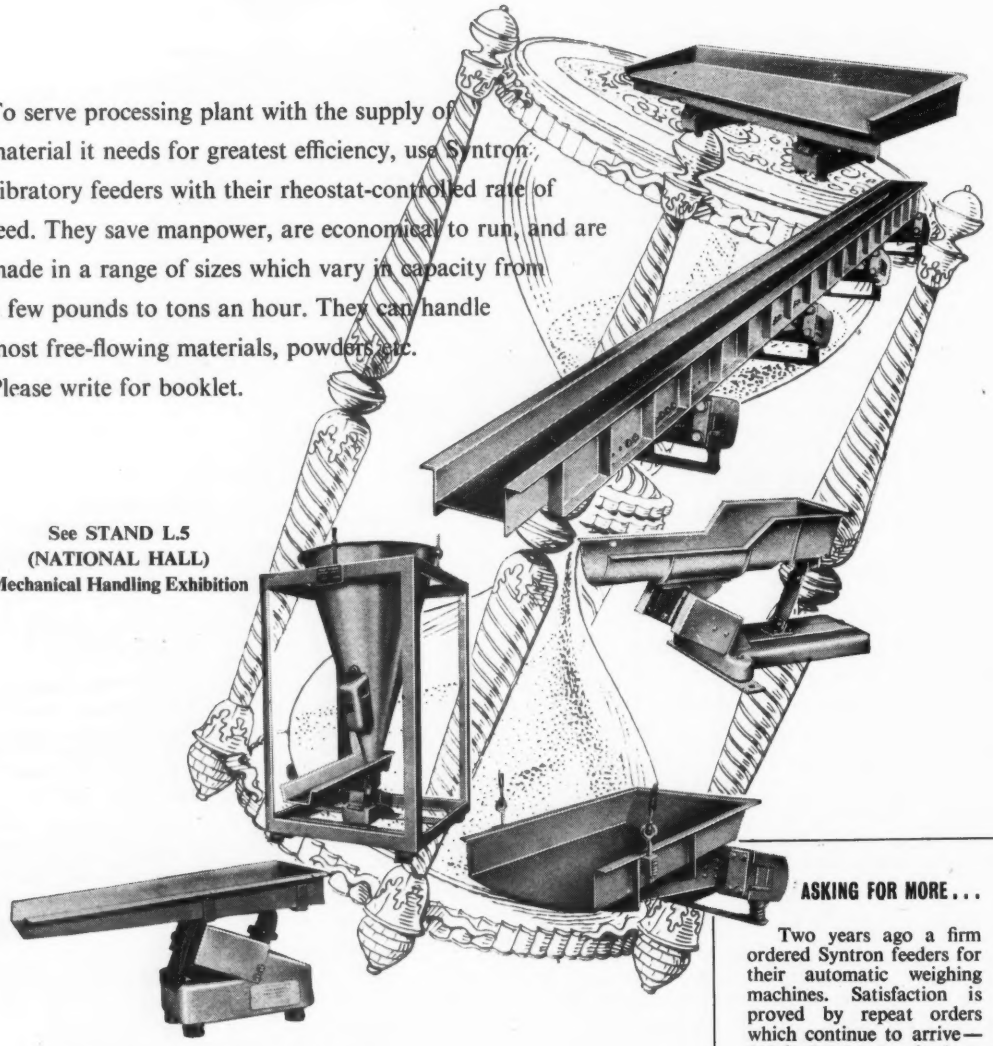

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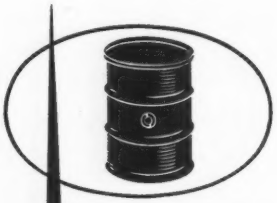

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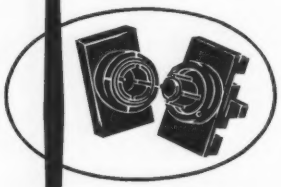

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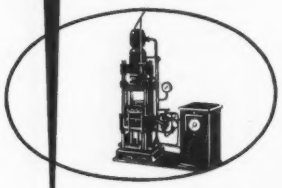

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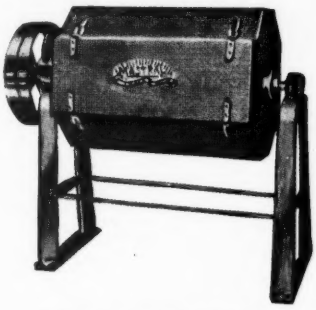

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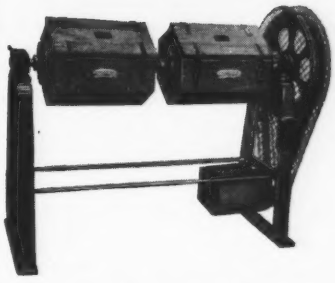
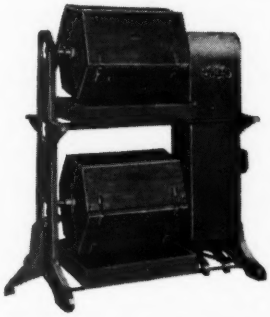


TWIN BARRELS



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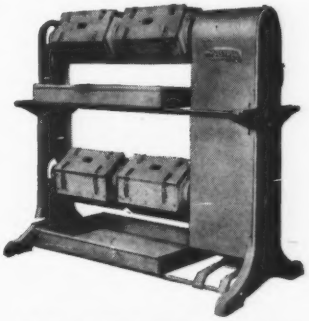

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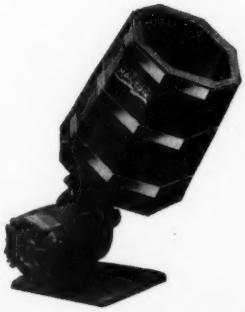

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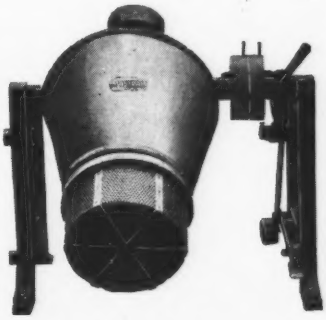

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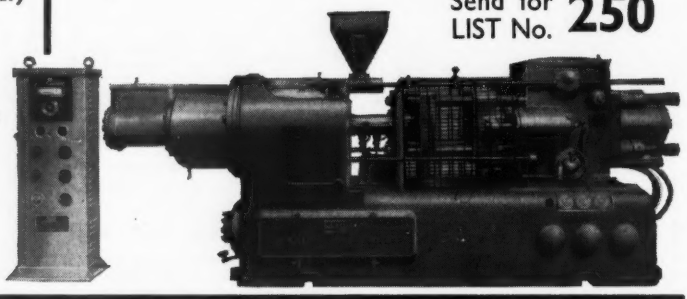

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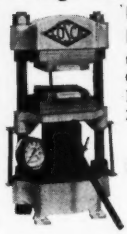

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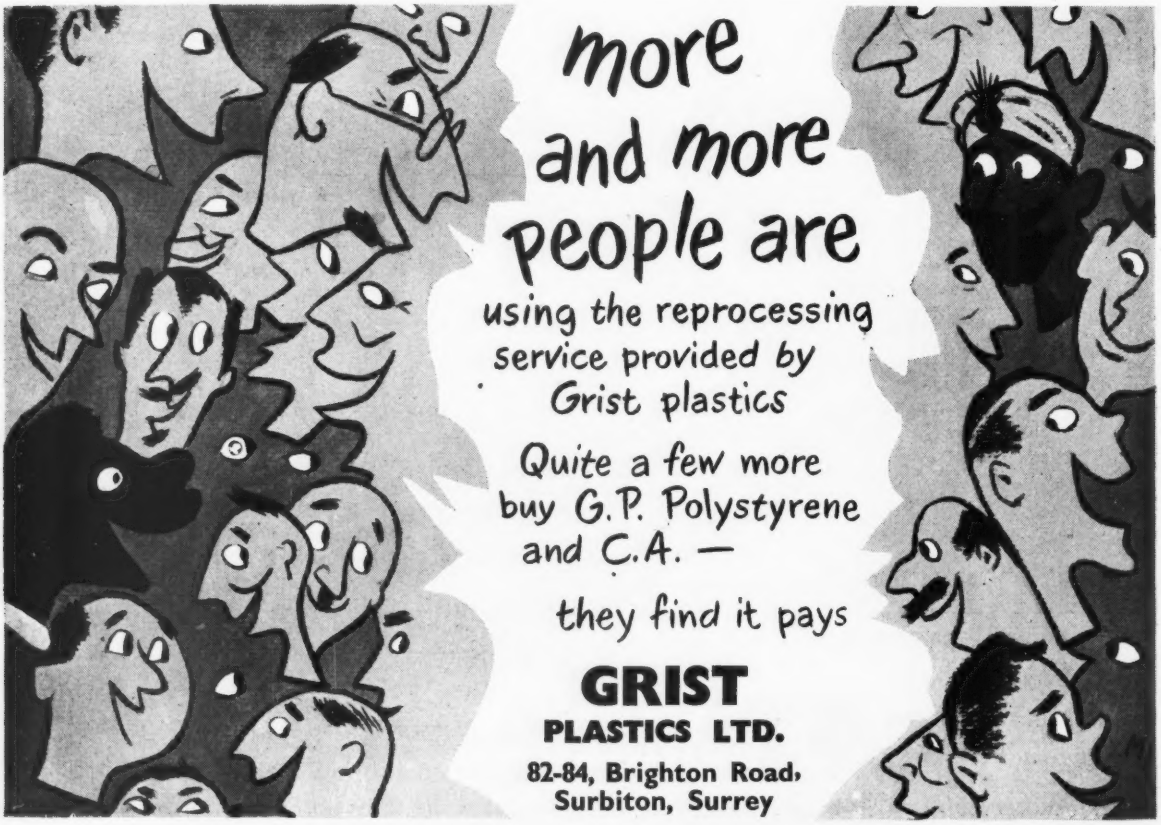

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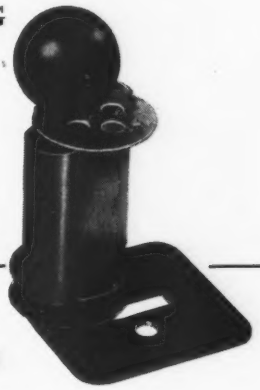

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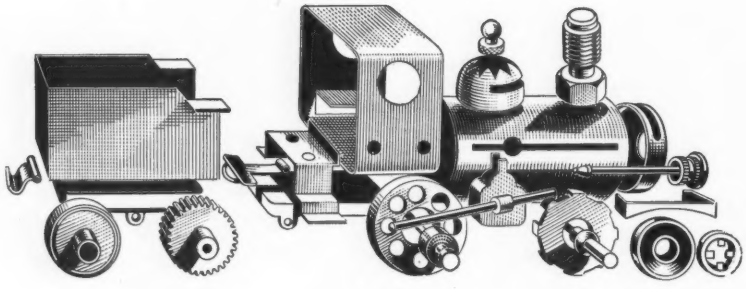

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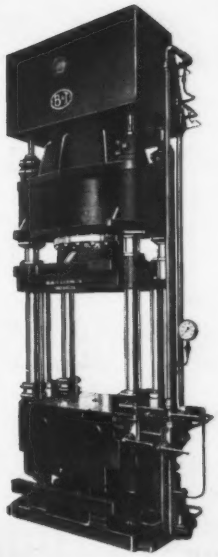

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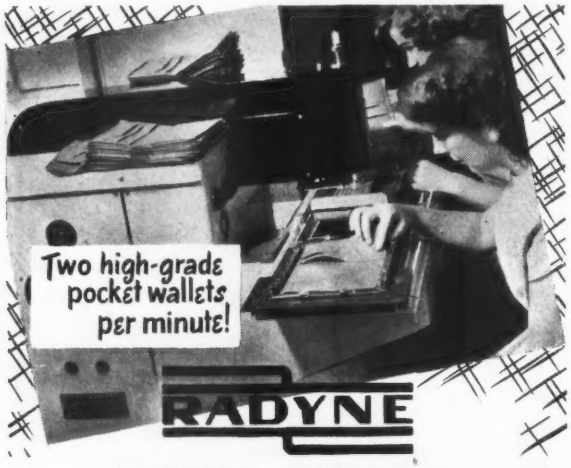

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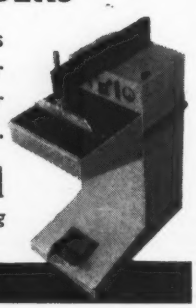

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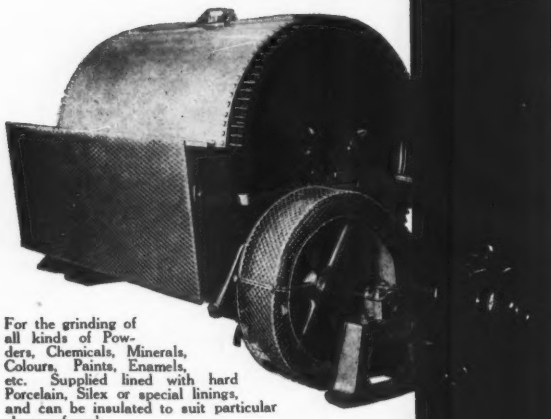

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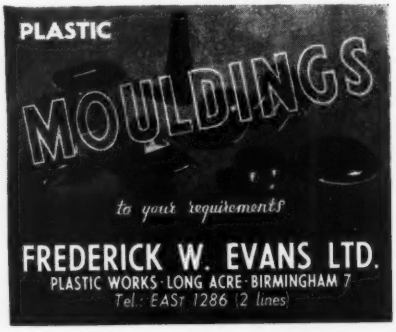

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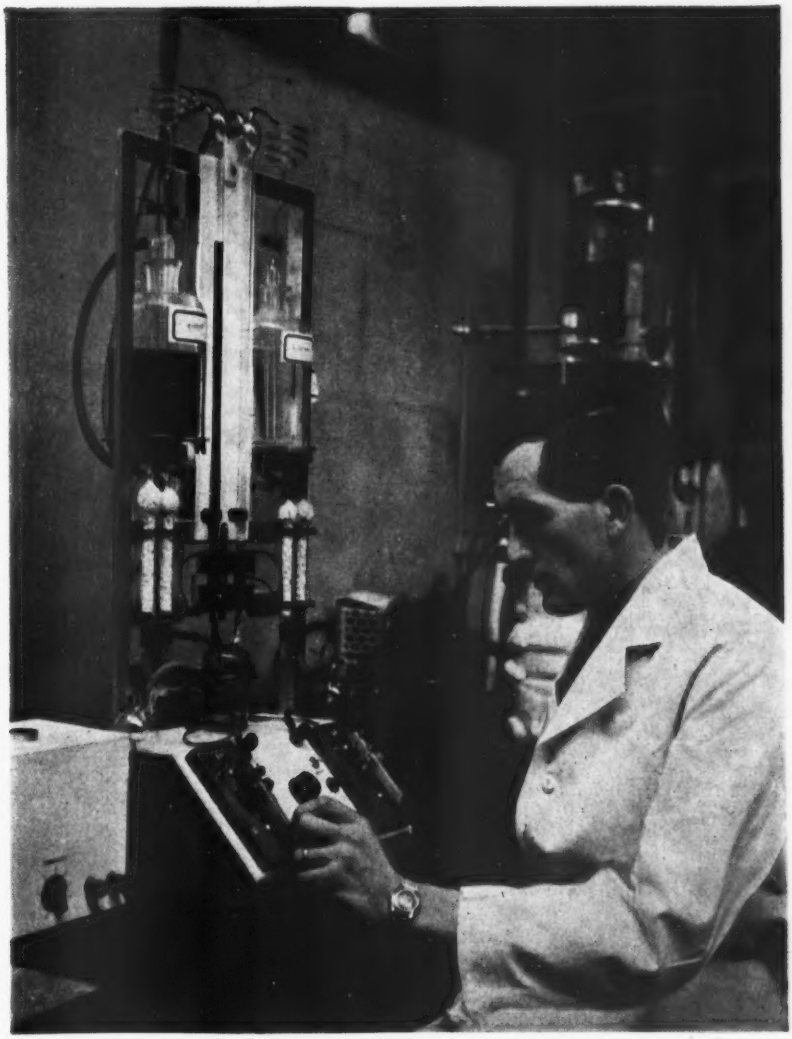

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